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BRITISH MUSEUM
NATURAL HISTORY

PROCEEDINGS
OF THE
Bournemouth Natural Science Society.

VOL. XXVI.

SESSION 1933-34.

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Bournemouth Natural Science Society.

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PUBLISHED BY THE SOCIETY AT ITS HOUSE,
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BRITISH MUSEUM
NATURAL HISTORY

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Introductory Note.

THE Bournemouth Natural Science Society was founded in 1903, being the successor to an older society which was formed in 1883 and dissolved in 1897. The early meetings of the Society were held in a room hired from time to time for the purpose, but the need of some fixed quarters was soon felt. To meet this need a small room was taken at 122 Old Christchurch Road, and, as this proved inadequate, in February, 1909, better accommodation was secured at Granville Chambers and retained for four years. In March, 1913, the Society took on lease from the Education Committee a large room on the ground floor of the Municipal College. In 1919 this also had to be given up, and the Society succeeded in acquiring a house of its own, 39 Christchurch Road. The formal opening was on February 7, 1920. In 1929 a Lecture Hall was added, and the ground floor of the old building reconstructed. The work was completed and the New Hall inaugurated on October 14, 1929.

The objects of the Society are declared by the second of its rules to be " the promotion of the study of Science in all its branches, by means of Lectures, Field Meetings, the Reading and Discussion of Papers, and the formation of Sections of its members devoted to any particular branch of the Society's work, and in any way that the Council of the Society shall deem advisable."

The Sections at present working are as follows:—**Archæological and Historical, Astronomical, Botanical, Entomological, Geographical, Geological, Microscopical, Photographic and Record, Physical and Zoological.**

During the WINTER SESSION, from October to April, GENERAL and SECTIONAL MEETINGS are held, comprising Lectures and Demonstrations on subjects of scientific interest, illustrated by lantern slides, diagrams, specimens or experiments.

All meetings are open to all members of the Society.

Throughout the SUMMER SESSION, EXCURSIONS to places of interest in the neighbourhood are arranged and indoor or garden meetings occasionally held.

The management of the Society is vested in a Council, which is elected at the Annual General Meeting, held in October.

The Society possesses a Library available for the use of members. This is yearly becoming more extensive and valuable by the acquisition of standard text books and of books dealing with matters of local scientific interest. Books may, under certain conditions, be borrowed by members, and there is a Reading Room in which works of reference may be consulted.

The Society's collections of archæological, botanical, geological, zoological and other specimens are now arranged in the MUSEUM. Articles on the collections were contributed to Vols. V. X. and XVII. of the Proceedings by Sir Daniel Morris, Mr. W. G. Wallace and Rev. C. O. S. Hatton respectively.

Members are elected by the Council and pay an annual subscription of £1 for full membership (admitting to all meetings and excursions for the year), a subscription of £2 covers four adult members of the same family residing in the same house.

A MONTHLY NOTICE, giving full details of all meetings, etc., is posted to every member before the beginning of each month, and a volume of Proceedings is published every year.

Application Forms for Membership, and further particulars, can be obtained from the

HON. SECRETARY,

Bournemouth Natural Science Society,
39 Christchurch Road,
Bournemouth.

Bournemouth Natural Science Society.

OFFICERS AND COUNCIL FOR 1933-34.

President

REV. F. C. R. JOURDAIN, M.A., F.Z.S., M.B.O.U.

Vice-Presidents

H. Backhouse, F.R.H.S.
G. Brumell, A.R.I.B.A.
H. Bury, M.A., F.L.S., F.G.S.
G. E. J. Crallan, M.A., M.B., M.R.C.S.
Dukinfield H. Scott, M.A., LL.D., F.R.S., F.G.S., F.L.S.
Claude Lyon
Miss Marcia Penrose, B.SC.
Heywood Sumner, F.S.A.

Chairman of Council

H. Bury, M.A., F.L.S., F.G.S.

Deputy-Chairman of Council

Rev. F. C. R. Jourdain, M.A., F.Z.S., M.B.O.U.

Council

The Officers, and Chairmen of Sections (ex-officio)

F. Broad, F.S.I.
E. St. John Burton, F.G.S., F.L.S.
R. K. Cardew
Miss C. H. Fryer
F. L. Lowther
C. Conyers Morrell, M.D., F.R.A.S.
Miss M. Penrose
J. F. Spencer
H. J. Wadlow
Miss S. Wetherell
W. J. Woodhouse, A.C.P.
G. G. Wren

Chairmen of Sections

Archæological and Historical : A. S. Hemmy, M.SC.
Astronomical : W. Goodacre, F.R.A.S.
Botanical : L. Beeching Hall, F.L.S.
Entomological : P. M. Bright.
Geographical : Claude Lyon.
Geological : Henry Bury, M.A., F.L.S., F.G.S.
Microscopical : S. Whitaker.
Photographical and Record : S. Whitaker.
Physical : W. H. Marsh, B.SC.
Zoological : Rev. F. C. R. Jourdain, M.A., F.Z.S., M.B.O.U.

Hon. Treasurer

G. Brumell, A.R.I.B.A., Maori, 15 Richmond Park Avenue.

Secretaries

Hon. Secretary : R. Quick, F.S.A. (Scot.)
To whom all official correspondence should be addressed.
Hon. Assistant Secretary : W. J. Woodhouse, A.C.P., M.I.H., 35 Chatsworth Road.
Assistant Secretary : J. F. Spencer, Glenthorne Richmond Park Road.

Hon. Librarian

Claude Lyon, Shalimar, Wilderton Road.

Hon. Editor

J. R. White, M.A., Whitecot, Linwood Road.

Hon. Curator

B. Gorton, M.R.C.V.S., M.P.S.

Hon. Auditors

F. Broad. J. C. Woods.

Bankers

National Provincial Bank of England, Bournemouth

List of Members.

Revised to 5th November, 1934.

* Honorary Members. † Past Presidents.
o Original Members. l Life Members.
G Morris Gold Medallist. a Associate Members.
The year of election is given before the name of each member.

A

1932	Abbott, A. H.	Portman Cottage, 755 Christchurch Road
1932	Abbott, Mrs.	,, ,, ,, ,, ,,
1931	Adams, V. J.	7 Holdenhurst Road
1927	Adkins, H.	Glenavon, 107 Alumhurst Road
1934	Allan, Miss M.	6 Chigwell Road.
1920	Anderson, Col. E. B., C.B.E.	Woodmanton, 35 Wellington Road
1922	Anderson, Col. R. F.	Glenalmond, 5 Madeira Road
1923	Anderson, Mrs.	,, ,, ,,
1923	Anderson, Mrs. M.	Ranfurly, 18 Dean Park Road
1933	Andrews, Rev. P. T., M.A.	Foxwold, 34 Belle Vue Road, Southbourne
1932	Anstead, R. D., M.A., C.I.E.	St. Alkelda, Maple Avenue, Bishop's Stortford
1933	Anthony, Miss C. H.	53 R. L. Stevenson Avenue
1933	Armstrong, R. H., M.B., C.M. (Edin.)	2 Redhill Drive

B

1906	Backhouse, H., F.R.H.S.	Cavendish, Braidley Road
1929	Baker, H. J., F.I.A.	Clifton, Sandbourne Road
1930	Banks, R. McLachlan, M.B., C.M., D.P.H.	35 Norwich Avenue
1922	Barker, S.	66 West Cliff Road
1905	Barlow, E. W., B.SC., F.R.A.S., F.R. MET. S.	Greengates, Wadhurst, Sussex
1912	ABarraclough, A., M.A., F.R.G.S.	173 Richmond Park Road
1909	Barratt, J. Hayes	16A St. Anthony's Road
1924	Barratt, Mrs.	,, ,, ,,
1924	Barratt, Miss P. M.	,, ,, ,,
1927	Bater, G. W., B.A.	22 Dingle Road
1927	Bater, Mrs.	,, ,,
1927	Bater, Miss K. J.	,, ,,
1933	Beauchamp, A. H., L.R.I.B.A.	32 Hamilton Road, Boscombe
1931	Beckett, S. J.	Pineville Hotel, West Cliff Gardens
1932	Belcher, T. E.	Trefloyne, Sandringham Road, Parkstone
1920	Bennett, Risdon, M.A.	Yew Tree Cottage, Broadstone
1921	Bevan, Trevor	17 Stirling Road
1923	Bishop, E.	21 Surrey Road
1910	*Bond, F. Bligh, F.R.I.B.A.	454 Gloucester Road, Bristol
1920	Borrett, Surgeon-Capt. G. G., R.N.	c/o Rev. E. H. Horne, 64 Alum Chine Road
1932	Borrow, F.	The Knoll, 281 Charminster Road
1932	Borrow, Mrs.	,, ,, ,,

1929	Bourdass, Miss A.	7 Beaulieu Road
1929	Bourdass, Miss F.	,, ,,
1920	ABourne, Miss C. M.	24 Ravenscourt Road, West Southbourne
1930	†*Bower, Prof. F. O., D.SC., F.R.S.	2 The Crescent, Ripon
1932	Brett, R. K.	Anglebay, Colehill, Wimborne
1922	Brewitt-Taylor, Mrs. Ray	10 Forest Road, Branksome Park
1931	Bright, Percy M., J.P.	Nethercourt, 60 Christchurch Road
1926	Broad, F., F.S.I.	Manton Villa, 2 Oxford Road
1928	Broad, Mrs.	,, ,,
1921	Bromley, Miss	81 Lansdowne Road
1931	Brotherton, Commr. M., R.N	25 Stevenson Avenue, Westbourne
1917	Brown, Mrs. Edward	West Ridge, Chessel Avenue
1933	Brown, Mrs. V. C.	142 Richmond Park Road
1926	Brown, Lt.-Col. F. Tatton	Talbot Hurst, 3 Glenferness Avenue
1924	Browning, Miss E. M.	Littleholm, Ferndown
1905	*Brumell, G., A.R.I.B.A. Hon. Member 1933	Maori, 15 Richmond Park Avenue
1920	Brumell, Miss M.	,, ,, ,,
1920	Bryant, Miss M.	Sunnyhill, Hampden Lane, W. Southbourne
1929	Buckingham, H.	6 Bodorgan Road
1929	Burge, J. T.	Glenhurst, Braeside Road, West Moors
1927	Burrell, Mrs. A. E.	Freydan Lodge, Poole Road
1924	Burroughs, F. G.	63 Maxwell Road
1922	Burton, E. St. John F.L.S., F.G.S., F.Z.S.	Melville, 4 Howard Road
1922	†Bury, Henry M.A., F.L.S., F.G.S.	The Gate House, 17 Alumdale Road
1930	Bury, Mrs.	,, ,, ,,
1930	Bury, Miss G. E.	,, ,, ,,
1930	Bury, Miss G. I.	,, ,, ,,
1933	Byard, A. G.	2 Alton Chambers, Church Road East, Parkstone
1933	Byard, Mrs.	,, ,, ,,
1933	Byard, Miss M.	,, ,, ,,

C

1928	Calkin, J. B., M.A.	Wychwood School
1934	Cameron, J., M.D., D.SC.	Balmashanner, Grove Road
1934	Cameron, Mrs. J., J.P., F.R.S.G.S.	,, ,, ,,
1934	Cant, Mrs. E.	24 Poole Road
1919	Cardew, R. K., B.A.	Stafford Lodge, 26 Dean Park Road
1920	Cardew, Mrs.	,, ,, ,,
1932	Carr, Laurence	Newlands, Western Avenue, Branksome Park
1932	Carr, Mrs.	,, ,, ,,
1932	Chambers, W. H.	14 Douglas Road, Southbourne
1934	Chegwidden, T.	No. 1 Flat, 8 Wimborne Road
1934	Chegwidden, Mrs.	,, ,, ,,
1912	AChilver, Miss K. M.	2 Shaftesbury Road
1931	Clark, Miss K. E.	15a St. Mary's Road
1933	Clarke, Rev. W. Sydenham	Melbury Lodge, Wimborne
1927	*Clay, R. C. C., M.D., F.S.A.	The Manor House, Fovant, Wilts
1931	Clegg, J. H.	Mount Pleasant, Bury Road, Branksome Park
1932	Cole, G. H. C.	Oakham, Ashley Road, New Milton
1929	Colledge, T. C.	3 Watkin Road, Boscombe

1933	Collings, T. G.	54 Parkwood Road
1928	Connah, J., B.SC., F.I.C.	Braeside, 3 Braidley Glen
1928	Constantine, M. H.	Brendon, Nairn Road
1912	Cooper, Ernest	100 Old Christchurch Road
1926	Cooper, H. A.	25 Talbot Avenue
1934	Cooper, Andrew H.	,, ,,
1926 L	Cooper, J. S.	The Little Red House, Colehill, Wimborne
1903†o	Crallan, G. E. J., M.A., M.B., M.R.C.S.	17 St. Anthony's Road
1922	Crallan, Mrs.	,, ,,
1920	Cressey, Miss H.	Bramcote, 1 Glen Road, Boscombe
1931	Crocker, Mrs. Walter	Highridge, Ferndown
1934	Crofton, Miss V. H. Lowther	Flat 11, 6 Wimborne Road
1934	Croucher, Miss J. M.	Little Stanpit, Christchurch
1922	Crowther, Miss V.	Berwyn Bank, Poulner Hill, Ringwood
1933	Culpeper-Clayton, Mrs. N. C. B.	The Garden Flat, Balmoral, West Hill Road.
1931	Curgenven, Miss A. J.	6 Suffolk Road
1922	Curme, Miss M. E.	65 Lansdowne Road
1933	Curry, Donald A.	Lynton, Alyth Road
1928	Curtis, E. A., L.D.S.	Holm Dene, Poole Road
1928	Curtis, Mrs.	,, ,,
1928	Curtis, E. J. B., L.D.S.	,, ,,
1903*o	Curtis, W. Parkinson, F.E.S. Hon. Member 1922	Richmond Chambers, The Square

D

1927	Dacombe, J. M. J.	Gosfield Cottage, Winkton, Christchurch
1933	Daimpré, Rev. J. D. D.	St. Mary's Vicarage, Morden, Wareham
1920 A	Darke, Miss W. E.	25 Hawkwood Road, Boscombe
1921 A	Davies, Miss H. V., B.SC.	Municipal College
1932	Davy, Miss M.	6 Twynham Road, Southbourne
1924	Deas, J., M.A., I.C.S.	57 Wellington Road
1930	de Castro, H.	Seldown House, Poole
1934	Dell, W. G.	15 Stourcliffe Avenue
1926	de Paiva, Miss E.	Sunny Halt, Hamilton Road, Boscombe
1934	Dodd, Mrs.	140 Richmond Park Road
1928	Dodds, H.	19 Foxholes Road, Southbourne
1910	Dodshon, E., LL.B.	124 Old Christchurch Road
1933	Dodwell, Mrs. L. B.	36 Carbery Avenue
1933	Donald, Mrs. K. V.	57 East Avenue
1933	Draper, Miss D.	8 Rufford Gardens, ,Tuckton
1928	Drew, Lt.-Col. C. D., D.S.O., F.S.A.	Dudsbury House, Longham, Wimborne
1929	Drew, R. C.	66 Wimborne Road
1929	Drew, Mrs. E. M.	,, ,,
1929	Drew, R. E. I.	,, ,,
1923	Druitt, Mrs.	Willow Lodge, Mudeford, Christchurch
1925	Druitt, Miss C. M.	99 Lowther Road
1925	Druitt, Miss C. S.	,, ,,
1928	Dundee, Col. W. J., C.I.E., R.E., F.R.G.S.	38 Portchester Road
1926	Dundee, Mrs.	,, ,,
1921	Dunn-Gardner, R. C.	24 Queensberry Place, S. Kensington, S.W.7

E

1934	Edwards, Miss E. M.	Ladies' National Club, 26 Poole Road
1929	Eldridge, Mrs. H.	L'Incontro, 9 Penn Hill Avenue, Parkstone
1922	Ellis, Mrs.	10 Forest Road, Branksome Park
1922	Ellis, Miss W. M.	,, ,, ,,
1923	Elrington, Mrs.	Mavis Bank, 15 Bodorgan Road
1929	Evans, C. I., M.A.	Boundway Top, Sway, Lymington
1909	Evans, P. H. L., M.A.	Stirling House, 28 Manor Road
1927	Exon, C., M.A.	12 Douglas Road, Southbourne

F

1919	Farmar, Mrs. K. A.	Whitton Lodge, Stevenson Crescent, Parkstone
1922	Farmar, Miss E. A.	,, ,, ,, ,,
1934	Fell, Mrs. A. G.	Moorings, Wimborne
1927	Finlinson, F. J.	Daneshill, 43 Queen's Park Avenue
1934	Finnis, Miss F. M.	Riversdale, Poole Road, Wimborne
1903 OA	Firbank, Miss, LL.A., A.C.P.	5 Buchanan Avenue
1932	Fiske, T. H., M.D.	13 Penn Hill Avenue, Parkstone
1932	Fiske, Miss C. A.	,, ,, ,,
1932	Fiske, Miss E. H.	,, ,, ,,
1933	Floyd, S. G., M.D., B.S.	142 Norton Road
1922	Fonblanque, Miss Ida	4 Gordon Road
1929	Forbes, A. G.	25 Courtfield Gardens, London, S.W.5.
1925	Fountain, E. D., L.R.C.P., M.R.C.S.	Vron, 30 Mansfield Road, Parkstone
1933	Fountain, Mrs.	,, ,, ,,
1922	Fowler, A. R. W., B.A.	St. Ina, Beechwood Avenue
1922	Fowler, Mrs.	,, ,, ,,
1919	Fowler, Miss M. L.	Lerryn, Chessel Avenue
1933	†Freeman, J. P. Williams, M.D.	Curdridge, Botley, Southampton
1932	French, F. P.	13 Alyth Road
1923	Fryer, Miss C. H.	Moulton, 46 Wellington Road
1928	Fryer, Miss G. M.	2 St. Cross, Bodorgan Road
1928	Fulcher, L. W., B.SC.	60 Herberton Road

G

1934	Gandy, H. G., C.B.E., D.L., M.A	Dormy Hotel, Ferndown
1926	Gardiner, H. L.	Granville Court Hotel, East Cliff
1922	Gatty, Lady K.	Ossemsley Manor, Christchurch
1922	Gatty, Miss H.	,, ,,
1922	Gatty, Oliver	,, ,,
1922	Gatty, Richard	,, ,,
1934	Gibbons, A.	Highmead, Warmwell, Dorchester
1934	Gibbons, Mrs. H. M.	,, ,,
1923	Gibbs, F. L. A.	Hawthorns Hotel, West Cliff Road
1933	Goff, A. E.	78 Parkstone Road, Poole
1929	Goodacre, W., F.R.A.S.	Waratah, Leicester Road
1931	Goodman, C. H.	8 Foxholes Road, Southbourne
1927	Gorton, B., M.R.C.V.S., M.P.S.	22 Arnewood Road
1921	Gosse, W., M.D., D.P.H.	Langley, Rowlands, Wimborne
1932	Grassendale School	Southbourne
1933	Grayson, Miss L.	39 Fernside Road, Poole
1917	Grindley, Miss E. J.	67 Princess Road

H

1931	Haines, Mrs. E. M.	Appleslade, Ringwood
1929	LHaines, G. E.	602 Christchurch Road, Boscombe
1930	Haines, H. H., C.I.E., F.L.S.	Glyn Cogan, Berriew, Mont.
1931	Haines, Miss E. S.	,, ,,
1924	Hall, L. Beeching, F.L.S.	Bryn Aird, Blake Hill Crescent, Parkstone
1929	Hall, R. Radclyffe	10a Alum Chine Road
1933	Hancock, A. T.	22 Dunkeld Road
1933	Hancock, Mrs. N. H. J.	,, ,,
1933	Hancock, Miss H. M.	,, ,,
1933	Harding, H. F.	Heather Glen, Western Road, Branksome Park
1934	Harding, Mrs.	,, ,, ,, ,, ,,
1934	Harding, G. F.	,, ,, ,, ,, ,,
1934	Harding, Miss G. J.	,, ,, ,, ,, ,,
1913	Harris, Miss K.	Trescott Grange, Harvey Road, Boscombe
1912	Harrison, Henry	Eden Lodge, 7 Surrey Road South
1933	Harrison, H. W.	Green Pasture, Pennington, Lymington
1933	Harrison, Mrs.	,, ,, ,,
1914	Hartley, Dr. J.	62 Portchester Road
1914	Hartley, Mrs.	,, ,,
1922	Hartley, J. A.	,, ,,
1927	Hartree, D. G.	197 Holdenhurst Road
1932	Hatcher, F.	Hillcot, Constitution Hill, Parkstone
1933	Hatcher, Mrs.	,, ,,
1933	Hatcher, M. C. F.	,, ,,
1933	Hatcher, N. P. W.	,, ,,
1932	*Hatton, Mrs.	Dutch House, Cliff Road, Barton-on-Sea
1920	Hawes, Miss	The Moorings, 27 Nelson Road
1917	Haydon, C. J.	Ben Veula, 29 West Cliff Road
1934	Haydon, Rev. J. F., M.A.	Cheyne Court, 37 Surrey Road
1918	Haythorne, E. C. C.	Upmoor Cottage, Canford Cliffs
1934	Hedley, Miss I. F.	Durrant House, Durrant Road
1934	Hellier, M., O.B.E.	Alexandra Hotel
1921	Hellyar, Miss E. F.	Cerne Abbas, 1 Belvedere Road
1932	Hemmy, A. S., B.A., M.SC.	Anarkali, 45 Elgin Road
1917	Henderson, Miss A. J.	Springbank, 22 Fox Road, Greenock
1928	Henderson, Major H. E.	Tall Trees, Wayside Road, Southbourne
1928	Henderson, R. G., M.A., M.B., Ch.B. (Aber.), F.R.C.S. (Edin.)	87a Southbourne Road
1932	Henderson, Mrs.	,, ,,
1931	Herklots, H.	Highland House, Highland Road, Barton on-Sea
1931	Herklots, Mrs.	,,
1923	Hill, C. S.	Northfield, Chigwell Road
1933	Hill, Miss E. J.	The Roses, Chester Road
1927	Hills, Mrs. N.	The Malthouse, Cowsfield Green, Whiteparish, Salisbury
1930	Hilton-Johnson, Miss C.	12 Oban Road
1924	Hoare, Miss E.	Sea Gate, Cassel Avenue
1922	Holdom, Mrs. E.	Cranfield, Sandecotes Road, Parkstone
1911	Homer, L. V. C.	1 Carlton Road
1931	Homfray, Mrs. F.	Old Cot, Linwood, Ringwood
1929	Hooper, Miss M. N.	Southland, Corfe Castle
1934	Hooton, Maj.-Gen. A., I.M.S. (retd.)	6 St. Winifred's Road
1933	Hoppen, W.	Emly House, Barrack Road, Christchurch
1928	Horne, Rev. E. H., M.A.	64 Alum Chine Road
1934	Horsell, Miss M.	5 King Edward Road, Oldfield Park, Bath

1929	Houghton, Miss J.	20 St. Anthony's Road
1923	Howell, Mrs. Rees	Cintra, 35a Richmond Wood Road
1934	Hudson, Miss C. E.	Cliveden, Ferndown
1925	Humby, H. G.	Brackendene, 23 Wimborne Road
1927	Hunt, Mrs. F.	33 Stirling Road
1932	Hunt, Mrs. P.	Cone Cottage, 33 Twynham Road, Southbourne.
1926	Hurry, Mrs. G. L.	Glencairn, Manor Road
1926	Hurry, A. G., M.A.	,, ,, ,,
1930	Hurt, Miss C. E. C. J.	Flat 31, Ingleby, 6 Wimborne Road

I

1905	*Ibbett, F. W., M.A. Hon. Member 1920	Alwyn, 32 Lonsdale Road
1926	Innes, A. A.	Old Pines, Ferndown
1925	Insch, J. M.	18 Beechwood Avenue
1925	Insch, Mrs.	,, ,,
1930	Insch, Miss E.	,, ,,
1930	Insch, Miss S.	,, ,,
1934	Isaacs, G.	Melbury, Lindsay Road
1934	Isaacs, Mrs.	,, ,, ,,
1934	Isaacs, Miss Mabel	,, ,, ,,
1934	Isaacs, Miss Margaret	,, ,, ,,

J

1926	Jackson, Mrs. C. M.	The Dakota, Beaulieu Road, Alum Chine
1921	Jackson, Mrs. Gidlow	64 Portchester Road
1933	James, Mrs. M. G.	70 St. Alban's Avenue
1930	Jefferys, J. H.	Elpis, 43 Caledon Road, Parkstone
1923	Jenkins, Miss B. M.	7 Talbot Avenue
1932	Jennings, E. W., A.R.I.B.A.	11a The Avenue, Branksome Park
1933	Johnson, Miss A. C.	Rivelin, Avenue Road, Christchurch
1932	Jolly, J. B., A.M.I.MECH.E., L.R.I.B.A.	15 Grove Road
1932	Jolly, Mrs. G. A.	,, ,,
1932	Jolly, Miss M.	,, ,,
1930	Jones, Miss A. Parnell	Menstone, Frankland Crescent, Parkstone
1932	Jones, F. Lindsay	8 Clifton Road, Southbourne
1933	Jones, Dr. Felix	7 Surrey Road
1930	Jones, Mrs. W.	1 Park Road
1932	Jordan, Mrs. L. E.	39 Hawkwood Road
1927	†Jourdain, Rev. F. C. R., M.A., F.Z.S., M.B.O.U.	4 Belle Vue Road, Southbourne
1930	Jubb, Miss O.	12 Oban Road

K

1910	Kay, A. J.	Valliscourt, 100 Lowther Road
1930†	*Keeble, Sir F. W., K.B.E., D.SC., F.R.S.	Hammels, Boars Hill, Oxford
1929	Kendall, Mrs.	20 Serpentine Road, Poole
1928	Kendall, Miss G. J., A.R.C.M.	,, ,, ,,
1927	Kilburn, Miss Alice M.	9 Glenmoor Road, Winton
1927	Kilburn, Miss Annie	,, ,,
1929	Kitchin, E. H., M.A., M.B.	Haldon, Canford Cliffs
1933	Kitching, Mrs. A. E.	Fernworthy, Brunstead Road

1933	Knox, Col. R. W., D.S.O., F.R.C.S.	Millersholt, Wood Green, Salisbury
1933	Knox, Mrs. L. M.	,, ,, ,,

L

1934	Lambert, R.A.	Griffin Hotel, Wimborne
1930	Laughlin, Col. C.	Carbery Wood, Tuckton Road
1934	Lawrence, R. L. R.	The Woodlands, Canford, Wimborne
1923	Lawrence, Mrs.	66 Portchester Road
1932	Laxon, E. A.	The Ramblers, Ashley, New Milton
1932	Laxon, Mrs.	,, ,, ,,
1933	Leach, W. J.	43 Browning Avenue, Boscombe
1929	ALee, Miss L., LL.A., F.R.G.S., F.A.G.S.	69 Walpole Road
1930	Lefroy, Mrs.	Campbell House, Campbell Road, Boscombe
1910	Lendrum, Miss A. M.	13 Carysfort Road
1932	Leon, Miss N.	Heelde, Stapehill, Wimborne
1934	Lewin, Mrs. M. J.	10 Parsonage Road
1922	Littleboy, Miss E. S.	2 Bodorgan Manor, 30 Bodorgan Road
1923	Littlewood, Engineer Capt. A. W., R.N., retd., O.B.E., Chevalier Legion of Honour.	28 Princess Road
1928	Longbottom, Mrs.	Haslemere, Penrith Road, Boscombe
1931	Looker, Rev. William, F.G.S.	50 Queens Park West Drive
1920	ALove, W. J. E.	St. Clement's School House
1932	Lowther, F. L.	Lonsdale, Mayfield Avenue, Parkstone
1934	ALowther, Miss D. M., B.SC.	,, ,, ,, ,, ,,
1903	O*Lupton, Miss	The Cottage, St. John's Road, Sandown, I.W.
1909	L†Lyon, Claude	Shalimar, Wilderton Road, Branksome Park
1910	Lyon, Mrs.	,, ,, ,,

M

1908	Mackay, Miss	8 King's Park Road
1929	Mackay, Miss C. J.	,, ,,
1931	Mackessack, Mrs.	Kinloss, 83 East Avenue
1933	Maclean, Miss C.	16a Walpole Road, Boscombe
1933	Maclean, Miss L.	,, ,, ,,
1909	McBean, Miss S.	29 Parkwood Road
1932	McDougall, M., M.B., B.S.	8 Dunkeld Road
1932	McDougall, Mrs.	,, ,,
1920	Male, H. C., M.D., M.R.C.S.	35 Irving Road, West Southbourne
1933	Malim, Miss M. F.	21 Cavendish Road
1930	†*Malmesbury, The Rt. Hon. the Earl of, D.L., J.P.	Heron Court, Christchurch
1931	Marsh, W. H., B.SC.	Archways, Mount Pleasant, Ringwood
1933	Marston, A.	40a Surrey Road
1913	Martin, Miss F. G.	32 Southbourne Road
1934	Martin, Miss H.	36 Portarlington Road
1914	Mate, S. J.	10 Landseer Road
1921	Mate, Mrs.	,, ,,
1918	LMatthews, Mrs. J. P.	The Bungalow, Lascelles Road, Boscombe

1921	Mattocks, Mrs.	Meyrick Cliffs Hotel, Beacon Road
1930	Medwin, Miss G. L., M.B.E.	17 Ophir Road
1929	Meyrick, Sir George, BART.	Hinton Admiral, Christchurch
1930	Middle, Miss A. M.	Tregenna, Castle Lane
1931	Miles, Miss V.	21 King's Park Road
1930	Miller, Dr. A. H.	Branksea Tower, Osborne Road, Parkstone
1925	Miller, Miss B.	Sunnycroft, 15 Penrith Road, Boscombe
1926	Miller, Miss W. F., B.A.	,, ,, ,,
1932	Miller, Miss S. B.	48 Strouden Avenue
1934	Mitchell, Miss E. A.	109 Edgehill Road
1930	Molineux, A. W.	Wendover, Manor Road, New Milton
1922	Moore, Major T. C., I.M.S.	Verwood, Dorset
1931	Morrell, C. Conyers, M.D. (Brux), L.R.C.S., L.R.C.P. (Edin.), D.P.H., F.R.I.P.H.,F.R.A.S.	Mudeford House, Christchurch
1931	Morrell, Mrs. I. C., M.R.I.P.H.	,, ,, ,,
1908	Moss, Miss	The Grange, 52 Westby Road
1934	Mossop, Mrs. M.	Cranford, Compton Avenue, Lilliput, Parkstone
1929	Mott, Lady	4 Dingle Road
1933	Mott, Miss Agnes	,, ,,
1933	Mott, Miss J. H.	,, ,,
1924	Moulson, Miss R.	20 St. Stephen's Road
1932	Mullins, Miss D. E. A.	Rosemaryne, 111 Edgehill Road

N

1931	Nichols, Mrs.	Fanling, 58 Stirling Road
1931	Notcutt, E. A.	24 Southwood Avenue

O

1929	Ogden, Miss E.	Southland, Corfe Castle
1910	LOke, A. W., B.A., LL.M., F.G.S., F.S.A.	32 Denmark Villas, Hove, Brighton
1927	Oldham, H.	Holmesdale, 44 Browning Avenue
1920	Osborne, J. H.	Woodside, Kinson
1933	O'Sullivan, J., F.C.I.	33 Chessel Avenue, Boscombe
1922	Ousby-Trew, Miss	Overthorpe, Michelgrove Road, Boscombe
1929	Owen, H., B.A., M.B., M.R.C.S.	59 Manor Road
1929	Owen, Mrs.	,, ,,
1929	Owen, J. D.	Barnweill, 42 Strouden Avenue
1929	Owen, Miss E. D.	,, ,,
1929	Owen, Miss M. D.	,, ,,
1934	Oyler, Miss S.	Wood Green, Salisbury

P

1904	Painter, Mrs.	29 Talbot Road
1928	Parry, Miss A. K.	Tilneyhirne, St. John's Road, Boscombe
1934	Parsons, A. J.	Parva, Morrison Avenue, Westbourne
1926	Parton, Miss E. C.	197 Holdenhurst Road
1926	Parton, Miss M. A.	,, ,,
1926	Paterson, Miss L., J.P.	Corfe Lodge, Parkstone
1926	Paterson, Miss M.	,, ,,
1926	Paterson, Miss N.	,, ,,
1924	Pattinson, Dr. T. W.	59 Wellington Road
1924	Pattinson, Mrs.	,, ,,
1916	Penrose, Mrs.	Woodbury, 9 Grove Road

1916	Penrose, Miss F.	Woodbury, 9 Grove Road
1916	Penrose, Miss M., B.SC.	,, ,, ,,
1929	Phelps, Mrs. J. V.	Woodbury, East Avenue
1921	Phillips, Rev. C. A.	36 Dean Park Road
1921	Phillips, Miss C. E.	,, ,,
1934	Pickup, E. A.	24 East Avenue
1933	APike, Miss M. W., B.A.	Grovely Manor, Boscombe
1933	Platten, Mrs. A.	Rotherfield Greys, New Milton
1933	Platten, G.	Rotherfield Kennels, New Milton
1927	APocock, Miss E.	67 Wentworth Avenue
1921	Pontifex, R. D.	Dalton House, 68 Christchurch Road
1920	Pontifex, Mrs.	,, ,, ,,
1921	Pontifex, G. K. D.	,, ,, ,,
1926	Potter, Rev. Prof. M. C., M.A., D.SC., F.L.S.	Corley Croft, York Avenue, New Milton
1930	Potter, Miss R. M.	Etruria, York Road, Broadstone
1930	†*Prain, Lt.-Col. Sir David, C.M.G., C.I.E., F.R.S.	The Well Farm, Warlingham, Surrey
1934	Preston, Miss P.	22 Knyveton Road
1925	Price, L.	Oakwood, Harvey Road, Boscombe
1925	Price, Mrs.	,, ,, ,,

Q

1922	Quick, R., F.S.A. (Scot.), M.J.S.	Tregenna, Castle Lane
1924	Quick, Mrs.	,, ,,
1930	Quick, Miss L.	,, ,,

R

1927	Raine, A. D.	Milverton, Lymington
1927	Raine, Mrs.	,, ,,
1912	*Rankin, W. Munn, M.SC. (Leeds), B.SC. (Lond.) Hon. Member 1920	Municipal College, Burnley, Lancs.
1917	Ranshaw, Miss E. M.	9 Marlborough Road
1918	Ratcliffe, Mrs.	Brooklands, 32 Branksome Wood Road
1933	Rawlingson, Mrs. W. J.	Tankerville, 7 Owls Road, Boscombe
1919	Rayner, Miss F.	35 East Avenue
1905	*Rayner, J. F., F.R.H.S., M.B. MYC. S.	3 Cumberland Park, London W.3
1934	Redmayne, W. T.	Lynford House, Burley, Ringwood
1928	Rees, Miss C. St. B. M.	Invermay, Manor Road, Swanage
1927	Rees, Commandant S.J., F.R.G.S., J.P.	Durley Dean Hotel, West Cliff
1924	*Reid, Mrs. E. M., B.SC., F.L.S.	Pinewood, Milford-on-Sea
1932	Reid, Mrs. F. E. A.	29 Newstead Road, Southbourne
1919	ARichards, Miss E. E., B.SC.	3 Pine Tree Glen, Poole Road
1928	Richards, Mrs. E. M.	c/o Miss Borough, Spinney Cottage, Hordle, Lymington
1932	Richardson, F. W., F.I.C., F.C.S.	30 Queen's Park Avenue
1932	Richardson, Mrs.	,, ,,
1931	Richardson, Miss I. M.	87 Cranleigh Road
1926	Rix, Miss M. E. de B.	Wayside, Stourcliffe Avenue
1916	Roberts, H. Astley. B.A.	Shalvah, Wilfred Road, Boscombe
1918	Roberts, Mrs.	,, ,, ,,

1924	Robertson, W. G. A., M.D., D.SC., F.R.C.P., F.R.S. (Edin), F.S.A. (Scot.)	St. Margaret's, St. Valerie Road
1934	Robertson, Mrs. M. K. A., M.D., L.R.C.P., F.R.S.G.S.	,, ,, ,, ,,
1929	Robinson, Miss M. H.	14 Talbot Avenue
1929	Robinson, Miss W. A.	,, ,,
1923	Roden, Miss E. M.	12 Walpole Road, Boscombe
1933	ARooke, Kenneth B.	18 Wharncliffe Road
1914	*Roper, Miss Ida M., F.L.S.	The Curatage, 176 Chessel Street, Ashton Gate, Bristol
1933	Ross, Mrs. H. G.	Dingwall, Priory View Road, Moordown
1916	Rothwell, Mrs.	21 Wentworth Avenue, West Southbourne

S

1932	Sait, Miss M.	39 Hawkwood Road
1929	Saunders, Mrs. M. S.	Southernhay, Cambridge Road
1919	Savage, J. W.	41 Wentworth Avenue, West Southbourne
1927	Sayle, G. M.	Malvernbury, 83 Watcombe Road
1903	oScott, J. H., M.E., M.I.M.C.E.	Kirkby, 22 Linwood Road
1934	Screeton, Mrs. A.	57 Priory View Road, Moordown
1931	Scudamore, C. E., B.A., L.R.C.P.	18 Clifton Road, Parkstone
1926	Shann, W. A., M.B.	Blenheim Towers, Boscombe Spa Road
1914	Sharp, C.	Langdon, Parkstone
1919	Sharp. Miss E.	,, ,,
1933	ASheffield, Miss I. E.	177 Richmond Park Road
1927	Sherrard, Miss L. F.	31 Bryanstone Road
1932	Silvester, N., M.SC., F.A.Met.S.	East Cliff Hall
1916	Simpson, Rev. E. J. Douglas, M.A.	Maesbury, 3 Cavendish Road
1920	Simpson, N. Douglas, B.A., F.R.M.S., F.L.S.	,, ,,
1933	Slack, R. W.	40 Strouden Avenue
1934	Slicker, H. K.	133 Seafield Road
1932	Smalley-Platten, Mrs. C. I.	Rotherfield Kennels, New Milton
1914	Smyth, W. Johnson, M.D.	Killalief, 534 Holdenhurst Road
1922	Smyth. Miss M.	,, ,,
1915	Smythe, Mrs.	Willstead, 22 Cavendish Road
1920	Smythe, Miss D.	,, ,,
1916	Smythe, Miss K. M.	,, ,,
1922	Speakman, Mrs. E.	13 Milton Road
1932	Spence, W. G.	The Shieling, Highlands Road, Barton-on-Sea
1932	Spence, Miss J. G.	,, ,, ,,
1931	Spencer, C. T., F.R.A.S.	21 Alum Chine Road
1909	Spencer, J. F.	Glenthorne, 73 Richmond Park Road
1933	Spencer, Mrs. I.	Athelney, Westminster Road
1923	Stables, A. D.	Saxthorpe, St. Osmund's Road, Parkstone
1923	Stables, Mrs.	,, ,, ,, ,,
1926	Standring, Mrs.	Naseby Nye, Byron Road, Boscombe
1923	Starr, Col. W. H., C.B., C.M.G., C.B.E.	4 Foxholes Road, Southbourne
1931	Stephens, Miss S.	21 Albemarle Road
1934	Stephenson, Miss L. E.	Braidley Lodge, Braidley Road
1916	Stiff, S. J., B.SC.	Norden House, Corfe Castle
1916	Stiff, Mrs.	,, ,,
1916	Stiff, Miss M. J.	,, ,,
1933	Stockdale, Miss K. H.	72 St. Alban's Avenue

1928	Stone, Miss E. J.	7 Strouden Avenue
1924	Story, F. N.	Storyland, Church Road, Southbourne
1924	Story, Mrs.	,, ,, ,, ,,
1932	Street, C. E.	10 Waltham Road
1932	Sturt, C. E.	Sherwood, Grasmere Road
1933	Sturt, Mrs. C. E.	,, ,,
1918	**G**†*Sumner, Heywood, F.S.A.	Cuckoo Hill, South Gorley, Fordingbridge
1928	Sutherland, W.	Silverdale, 20 Penn Hill Avenue, Parkstone
1928	Sutherland, Mrs.	,, ,, ,,
1922	ASymes, H., M.A.	52 Lowther Road

T

1911	Tatchell, Leonard, F.E.S.	Swanage,
1928	Taylor, Mrs. R. A.	17 Dunbar Road
1933	Telfordsmith, Telford, M.A., M.D.	24 Poole Road
1925	AThomasson, Miss M. E.	37 Belvedere Road
1928	Thompson, Rev. J. C., F.G.S.	Cragside, Manor Road, New Milton
1929	Thomson, A. G. A., M.A., M.B.	38 Wentworth Avenue, Boscombe
1932	Thomson, Mrs.	,, ,, ,,
1928	Thornton, Mrs. Sykes	Moorland Court, Queen's Park West Drive
1911	Tickell, Miss S. M.	Capri, 90 Richmond Park Avenue
1933	Trendell, P. G.	Danesmead, Golden Hill, Hordle, Lymington
1933	Trendell, Mrs.	,, ,, ,,
1932	Trotter, Mrs. Henry	4 East Avenue
1931	Trotter, Miss E., C.B.E.	,, ,,
1934	Trotter, Miss E. C.	,, ,,
1933	Tucker, C. E.	Silvermere, 40 Hengistbury Road
1929	Tucker, Mrs. E. M.	39 Hamilton Road
1934	Tuke, Major G. H.	Clare Lodge, Foxholes Road
1914	Twemlow, Miss E. E.	Devon Lodge, 83 Alumhurst Road

V

1918	Vorse, John	Leighurst, Walkford, Christchurch

W

1924	Wadlow, H. J.	The Gables, Queen's Grove, Parkstone
1921	Wales, Miss	The Nook, 4 Ormonde Road, Branksome Park
1921	Wales, Miss N.	,, ,, ,, ,,
1913	Wallace, W. G.	Doveshill Cottage, Ensbury Park
1931	Wallace, Mrs. F. E.	Abbotsfield, Leicester Road
1912	Walter, Mrs. G. P.	Rusholme, 10 St. Anthony's Road
1920	LWanstall, W. S.	Del Monte, 6 Roslin Road
1920	LWanstall, Mrs.	,, ,,
1933	Ward, L.	17 Bridge Street, Christchurch
1932	Watkins, H. G.	Leyland House, Osborne Road, New Milton
1930	Webb, Mrs. F. J.	6 St. Anthony's Road
1928	AWebber, A. E.	28 Tower Road, Boscombe
1932	Weekes, C. P., F.R.C.S. (Edin.)	3 Rotherfield Road, Boscombe
1932	Welch, Prof. J. J.	11 Beechwood Avenue, Boscombe
1928	Welfitt-Nicholls, Miss C.	Campions, Sandy Lane, Riverhead, Sevenoaks

1913	Wetherell, Miss M.	Triana, 31 Harvey Road, Boscombe
1920	Wetherell, Miss S.	,, ,, ,, ,,
1934	Wethey, Mrs.	24 Poole Road
1918	Whitaker, S.	22 Somerset Road, Boscombe
1924	Whitaker, Miss E. M.	,, ,, ,,
1924	Whitaker, S. E., P.A.S.I.	22 Selwood Road, Addiscombe, Croydon
1920	White, J. R., M.A.	Whitecot, 15 Linwood Road
1931	aWhite, S. J.	7 Gilbert Road
1929	Whiteley, F. W.	7 Charminster Road
1919	Williams, John	Brynmill, 68 Southcote Road
1926	Williamson, H. J.	Quiddington, Birchwood Road, Parkstone
1934	aWilliamson, A., B.SC.	47 Victoria Avenue, Winton
1929	Windsor, Mrs. E.	Cragside, Manor Road, New Milton
1932	Witherby, R. B.	Cranfield, Sandecotes Road, Parkstone
1932	Witherby, Mrs.	,, ,, ,,
1934	aWood, J., M.SC., A.I.C.	71 Parkstone Road, Poole
1920	Woodhouse, Rev. A. P.	Deanhurst, 5 Littledown Road
1903	oWoodhouse, W. J., A.C.P., M.I.H.	35 Chatsworth Road, Malmesbury Park
1918	Woodhouse, Mrs.	,, ,, ,,
1923	Woodhouse, W. R.	,, ,, ,,
1923	Woodhouse, Miss M. M.	,, ,, ,,
1931	Woods, J. C.	Pine Croft, Rothesay Road
1931	Woods, Mrs.	,, ,, ,,
1930	†*Woodward, Sir A. Smith, F.R.S., F.L.S., F.G.S.	Hill Place, Haywards Heath, Sussex
1932	Wren, G. G.	264 Charminster Road

Y

1929	Young, Miss E.	11 Borthwick Road, Boscombe

Annual Meeting, 1934.

The thirty-first Annual Meeting was held on Saturday, October 20th, at 3 p.m., and was presided over by Mr. Henry Bury, Chairman of Council. The Hon. Secretary, Mr. Quick, read the Minutes of the last Annual Meeting and the Council's Report for the year; the Treasurer submitted his Statement of Accounts. These were adopted on the proposal of Mr. John Williams, seconded by Major Henderson, the proposer suggesting a further effort towards the affiliation of local schools.

In proposing a vote of thanks to the retiring President, Mr. Lyon detailed Mr. Jourdain's varied services to the Society as Chairman of the Zoological Section, as Vice-Chairman of the Council, as a brilliant lecturer and generally during his term of office. Dr. Crallan supported the motion, which was carried by acclamation.

The Chairman then proposed as the new President Sir Frank Dyson, K.B.E., F.R.S., etc. Mr. Bury, while drawing attention to the singular fact that the Presidential Chair had never been occupied by an Astronomer, congratulated the Society on at last repairing this deficiency by the election of the late Astronomer Royal, the most distinguished exponent of the Science in the country at the present time. Mr. Goodacre, himself a Fellow of the Royal Astronomical Society, to whose influence the new appointment is largely due, cordially supported the motion, which was enthusiastically carried.

All retiring officers were then re-elected on the motion by Mrs. Rothwell, supported by Mr. Hayes Barratt.

Referring to the election of Chairmen of Sections, the Chairman expressed regret that owing to unforeseen circumstances no nominations were forthcoming for the sections devoted to Botany and Entomology. These vacancies would be filled in due course by the Council, which has power to act in such emergencies. For the remaining Sections the retiring Chairmen were re-elected, on the motion of Mr. Wren, seconded by Miss M. Penrose.

The cordial thanks of the Society to the retiring Auditors was duly accorded, and on the proposal of Miss Twemlow, seconded by Mr. Quick, both were re-elected.

Vacancies on the Council were filled, on a ballot, by Messrs. Broad, Burton, Hall, Wadlow, and Miss Fryer. A vote of thanks to the Chairman, proposed by Mr. White, and seconded by Dr. Morrell, concluded the proceedings.

Council's Report, 1934.

THE Thirty-first Annual Report indicates a Membership of 526, including 17 Honorary Members, 11 Past Presidents, 7 Life Members, 20 Associates, and 6 Original Members.

During the past year there have been held :—

	The Annual Meeting
	The Presidential Address
3	General Meetings
19	Evening Meetings
3	General Excursions
11	Evening Rambles
2	At Homes
	Garden Party and Play
12	Club Days
63	Sectional Meetings
42	Sectional Excursions

as recorded in the following list :—

GENERAL.

Lectures and Meetings.

(* Illustrated by Lantern Slides.)

1933.	
Oct. 28.	Annual Meeting.
Nov. 1.	Evening Meeting. " Migration of Birds." F. L. Lowther.
Nov. 4.	Presidential Address. Rev. F. C. R. Jourdain.
Nov. 15.	Evening Meeting. " Plutarch on Modern Science." A. G. Byard.
*Nov. 18.	" G. F. Watts." R. Quick.
*Nov. 20.	" Ceylon and Japan." N. D. Simpson.
Nov. 28.	Club Day.
*Dec. 8.	Evening Meeting. " Sand." W. J. Woodhouse.
Dec. 11.	Club Day.
Dec. 20.	Evening Meeting. " Flight." B. Gorton.
1934.	
*Jan. 8.	Evening Meeting. " From Coal to Gas." A. G. Byard.
Jan. 22.	Club Day.

1934.	
*Jan. 31.	Evening Meeting.
	" A Yorkshire Dale." E. R. Wethey.
*Feb. 14.	Evening Meeting.
	" Orderly Arrangement in Plants," F. L. Lowther.
Feb. 26.	Club Day.
Feb. 28.	Evening Meeting.
	" The Rare Metals and their Uses." Miss M. Penrose.
Mar. 7.	Evening Meeting.
	" Introduction to the Study of Bones." B. Gorton.
*Mar. 14.	Evening Meeting.
	" Petroleum." A. G. Byard.
Mar. 21.	Evening Meeting.
	" Bones of Mammals." B. Gorton.
Mar. 26.	Club Day.
Mar. 28.	Evening Meeting.
	" Topography of England and Wales." R. K. Cardew.
*Apr. 4.	Evening Meeting.
	" Some Aspects of Plant Lore." F. L. Lowther.
Apr. 9.	Club Day.
Apr. 18.	Evening Meeting.
	" Camouflage among Common Birds." C. E. Tucker.
*Apr. 21.	" Ivory." R. Quick.
*May 2.	Evening Meeting.
	" New Zealand." Rev. E. R. Weeks.
May 7.	Club Day.
*May 16.	Evening Meeting.
	" The Danube." Miss Mortimer.
May 23.	Evening Meeting.
	" History of Chemistry." J. Wood.
June 18.	Club Day.
July 14.	Garden Party.
	" The Winter's Tale." The Leamor Players.
July 17.	Evening Meeting.
	" The Isle of Wight." R. K. Cardew.
July 23.	Club Day.
Aug. 15.	The President " At Home " at Whitekirk.
Aug. 20.	Club Day.
Sept. 24.	Club Day.
Oct. 10.	Evening Meeting. R. K. Cardew.
Oct. 11.	Club Day.

Excursions and their Leaders.

July 18.	Christchurch. Mrs. Rothwell.
July 24.	Wallhampton and Calshot. Messrs. Marsh and Whitaker.
Aug. 16.	The Treloar Home at Alton. R. Quick.

Evening Rambles and Leaders.

June 8.	Bear Cross. Miss Finnis.
June 14.	Parley. F. L. Lowther.
June 22.	The Upper Gardens. C. E. Scudamore.
June 25.	Mudeford. R. K. Cardew.
July 4.	Somerford Bridge. Mrs. Richards.
Aug. 14.	The Upper Gardens. C. E. Scudamore.
Aug. 24.	Poole Park. H. J. Wadlow.
Aug. 31.	Littlesea. F. L. Lowther.
Sept. 5.	Bear Cross. R. K. Cardew.
Sept. 26.	Somerford Bridge. Mrs. Richards.
Oct. 4.	Branksome Woods. F. L. Lowther.

SECTIONAL.

Archæological and Historical Section.

Lectures and Meetings.

1933.	
*Nov. 11.	" New Light on the Old Stone Age." H. Bury.
*Nov. 25.	" Petra." Col. H. E. Crocker.
Dec. 18.	" Roads, Ancient and Modern." Dr. Williams-Freeman.
1934.	
*Jan. 10.	" Ancient Rome." R. G. Todd.
*Feb. 7.	" Sicily." C. K. Muspratt.
*Mar. 10.	" The Stone Age." R. Quick.
Mar. 19.	" Excavations at Thickthorn Barrow." Lt.-Col. Drew.
*Apr. 7.	" The Earliest Civilization of India." A. S. Hemmy.
*Apr. 19.	" The Catacombs of Rome." S. J. Beckett.

Excursions and their Leaders.

May 24.	Breamore and Romsey. A. S. Hemmy.
June 16.	Salisbury and Old Sarum. A. S. Hemmy.
July 19.	Isle of Wight. R. K. Cardew.
Aug. 23.	Dorchester and Maiden Castle. A. S. Hemmy.
Sept. 20.	Winchester and Bishop's Waltham. A. S. Hemmy.

Astronomical Section.

Lectures and Meetings.

1933.	
*Dec. 16.	" Life on other Worlds." A. G. Byard.
1934.	
*Jan. 20.	" The Enigma of the Earth's Outer Atmosphere." Dr. Conyers Morrell.
*Mar. 3.	" The Magic Numbers and Early Astronomy." Miss Trout.
*Apr. 28.	" Galileo." Dr. Conyers Morrell.

Botanical Section.

Lectures and Meetings.

1933.	
*Dec. 12.	" Questions—and some Answers." L. B. Hall.
1934.	
*Jan. 13.	" Magnetic Storms, Plant Growth and Prosperity." Dr. Conyers Morrell.
Feb. 9.	" Epidermis and Hairs of Leaves." L. B. Hall.
*Feb. 22.	" Plant Life and Folk-Lore." F. L. Lowther.
Mar. 22.	Informal Meeting.
Apr. 26.	" How Science has aided Horticulture." J. A. Nimmo.

Excursions and their Leaders.

Apr. 24.	Cowgrove. R. K. Cardew.
May 3.	Verwood. Major Moore.
May 8.	Lytchett Matravers. R. K. Cardew.
May 14.	Marlborough Deep. J. Vorse.
May 25.	Brockenhurst. H. J. Wadlow.
June 5.	Ower. T. E. Belcher.

June 12.	Creech Barrow. R. K. Cardew.
June 19.	Pepperbox Hill. Mrs. Rothwell.
June 28.	Bloxworth to Bere Regis. F. L. Lowther.
July 5.	Corfe. H. J. Wadlow.
July 12.	Hampreston. R. K. Cardew.
July 17.	Holmsley. J. Vorse.
July 26.	Beaulieu Road. L. B. Hall.
Aug. 2.	Moortown. R. K. Cardew.
Aug. 10.	Sway to Brockenhurst. H. W. Harrison.
Aug. 21.	Wareham. H. J. Wadlow.
Aug. 28.	Keyhaven. L. B. Hall.
Sept. 6.	Dudsbury. F. L. Lowther.
Sept. 13.	Morden. R. K. Cardew.
Sept. 18.	Spetisbury. R. K. Cardew.
Sept. 27.	Wool. H. J. Wadlow.
Oct. 2.	Moreton. R. K. Cardew.
Oct. 9.	Brockenhurst. Fungus Foray. Prof. Potter and J. Vorse.
Oct. 18.	Studland and Barrow Down. L. B. Hall.

Entomological Section.

Lectures and Meetings.

1933.	
Dec. 2.	Informal Meeting.
1934.	
Mar. 24.	"A Butterfly Farm." L. W. Newman.
Apr. 17.	"The Butterflies of the English Downs." P. M. Bright.

Geographical Section.

Lectures and Meetings.

1933.	
Nov. 8.	"The Double Tides in Bournemouth Bay." F. P. Dolamore.
*Nov. 27.	"My Visit to Le Mont Dore." A. Marston.
1934.	
*Jan. 2.	Children's "At Home." "The Wonders of Nature." C. Lyon. "Fire as a friend and as a foe." W. H. Marsh.
*Jan. 15.	"Petroleum on its Travels." A. G. Byard.
*Feb. 12.	"The Story of London Traffic." C. Lyon. (Supplied by the L.P.T.B.)
*Feb. 24.	"Old Bournemouth along the Bourne." W. J. Woodhouse.
*Mar. 12.	"Burma." O. McCowen.
*Mar. 29.	"A Bavarian Raft Trip." R. Quick.
*Apr. 5.	"Two Ancient Indian Cities." C. Lyon.
Apr. 18.	"At Home." "The Topography of England and Wales." R. K. Cardew.
*Oct. 6.	"How Modern Transport Overcomes Geographical Difficulties." A. G. Byard.

Excursions and their Leaders.

May 11.	Sherborne Abbey and Sandford Orcas Manor. C. Lyon.
May 15-17.	The "Echo" Printing Works. C. Lyon.
June 13.	The Bournemouth Fire Station. C. Lyon.
June 21.	Blandford and Purse Caundle. C. Lyon.

July 3.	Bournemouth Water Works and Cranborne Manor. C. Lyon.
July 10.	The H. and D. Motor Works at Southampton. C. Lyon.
Aug. 30.	The M. and P. Dairy Works. C. Lyon.
Sept. 12.	The Refuse Destructor. C. Lyon.

Geological Section.

Lectures and Meetings.

1933.	
Oct. 31.	"Mountain Building." Rev. W. Looker.
*Dec. 7.	"Fossil Man." H. Bury.
1934.	
Feb. 13.	Informal Meeting.

Excursions and their Leaders.

May 29.	Chapman's Pool. St. J. Burton.
June 27.	Creech Barrow. H. Bury.
July 13.	Tilly Whim. Messrs. Burton and Cardew.
Sept. 25.	Culpepper's Dish and Poxwell. Messrs. Bury and Gibbons.

Microscopical Section.

Lectures and Meetings.

1933.	
Nov. 9.	Informal Meeting.
Dec. 14.	,, ,,
1934.	
Jan. 11.	,, ,,
Mar. 16.	"Starches."
Apr. 13.	Objects of Interest.
May 18.	,, ,,
June 15.	,, ,,
July 20.	,, ,,
Aug. 17.	"Pollen and Sori."
Sept. 21.	Objects of Interest.
Oct. 19.	,, ,,

Photographic Section.

Lectures and Meetings.

1933.	
*Nov. 16.	"Norwich and Ely Cathedrals." S. Whitaker.
1934.	
*Jan. 18.	"York and Beverley Minsters." S. Whitaker.
*Feb. 15.	"Round the World with a Camera." H. A. Cooper.
*Mar. 17.	"Gothic Architecture in France." E. Dodshon.
*Apr. 23.	Members' Slides of Excursions.

Excursion and Leader.

June 11.	S. Wraxall Manor House. S Whitaker.

Physical Section.

Lectures and Meetings.

1933.	
*Nov. 23.	" Photo-electricity." R. M. Clark.
Dec. 9.	" Some Interesting Phases of the work of a General Analyst." F. W. Richardson.
1934.	
*Jan. 30.	" From Coal to Gas." A. G. Byard.
Feb. 17.	" The Solar System of the Atom." A. S. Hemmy.
Mar. 1.	" The Atom, the Inner Arcana." A. S. Hemmy.
Apr. 14.	" Some Experiments with Hydrangeas." Dr. Manley.

Zoological Section.

Lectures and Meetings.

1933.	
*Nov. 14.	" Some Birding Adventures." G. Marples.
1934.	
*Jan. 27.	" Tunisia." Rev. F. C. R. Jourdain.
Feb. 19.	Informal Meeting.
Apr. 11.	" Sympathetic Nervous System." B. Gorton.
June 7.	Informal Meeting.
Oct. 17.	Exhibition of Water-colour Paintings of Birds by Mrs. Trench (1840-45).

A notable excursion was made to Maiden Castle, where the party was met by Col. Drew, who exhibited the results of the recent extensive and interesting excavations.

The Council has pleasure in announcing that the late Astronomer Royal, Sir Frank Dyson, has consented to accept office as President for the coming year.

The death of Dr. Dukinfield Scott is deeply regretted. He had been President 1910-11, and again 20 years later. A brief sketch of his career is given in this volume. Other losses are Mrs. Scudamore, Mrs. R. Radclyffe Hall, Mr. H. T. Young, Mr. J. R. Williams, Mr. Carus-Wilson and Mr. R. Elrington.

Evening Meetings have become a permanent feature, though the attendance might well be increased.

The exhibition of Wild Flowers at the Lansdowne has been well maintained by the energy of Mr. Wadlow and other members of the Botanical Section.

The Building Fund has benefited by a Puzzle Competition organised by the Misses Penrose and by a garden performance of " The Winter's Tale" given by the Leamor Players. The Council offers special thanks to all who contributed to the success of these ventures.

The Society was represented at the Aberdeen Meeting of the British Association by Mr. Hemmy, and at the Reading Congress of the S.E. Union of Scientific Societies by Mr. Whitaker.

The Library and Museum have been enriched by various gifts from members.

A band of Swedish students once more made the Hall their summer headquarters. The rental from this and other bodies forms a valuable asset.

The Council tenders its sincere thanks to members who have given ready service in connection with Lectures and Excursions, by working the Lantern, by arranging for Tea, and by delivering the Proceedings.

⁂

To the Honorary Secretary,

Bournemouth Natural Science Society,

39, CHRISTCHURCH ROAD, BOURNEMOUTH.

Dear Sir,

I beg to propose that

M...

(Please give Christian name in full, and state title—Mr., Mrs., Miss, etc., and any degrees or qualifications.)

Address..

....

**who is personally known to me*
**who has produced satisfactory credentials to me* *be elected an* **Ordinary* **Associate*
Member of the Society.

Date.................. *Member's Signature* ....

I beg to second the above proposal

Date.................. *Member's Signature*.....................................

*Delete words not applicable.

FORM OF LEGACY.

The following FORM OF BEQUEST is recommended for adoption by those who may be desirous of leaving by Will money for promoting the objects and work of the Society :—

I give absolutely to the Treasurer for the time being of the Bournemouth Natural Science Society of No. 39 Christchurch Road, Bournemouth, for the general purposes of the Society the sum of £ s. d. free of duty, and I declare that the receipt of the said Treasurer for the time being shall be sufficient discharge for the said legacy.

Summary of Accounts for the Year ending 30th September, 1934.

RECEIPTS.

	£	s.	d.
Current A/c.			
Members' Subscriptions	439	2	0
Donations to General Fund	0	19	0
Sale of Proceedings of the Society	0	3	0
Rent from Tenants	71	13	4
Letting of Hall, etc.	37	2	0
Donations for Library	1	2	6
Refund from Bournemouth Education Committee of Cost of Wild Flower Exhibition 1933	0	16	5
Surplus from Excursions	20	17	0
Pennies for use of Telephone	1	1	2
Sundry	0	18	0
Interest Warrant not presented	0	16	10
	574	11	3
Balance from 1933	151	18	4

PAYMENTS.

	£	s.	d.	£	s.	d.
Interest on Debentures	151	13	0			
Less Tax	36	0	3			
				115	12	9
Interest on Loans	6	10	0			
Less Tax	1	10	11			
				4	19	1
Income Tax under Schedule D ...				0	15	0
Corporation Duty				2	12	8
Maintenance of the Society's House:—						
Rates	78	3	1			
Property Tax	51	5	0			
Water, Light and Heat ...	66	13	8			
Wages	59	11	10			
Insurances	15	15	3			
Rent of Telephone	9	15	6			
Furnishing and Upkeep ...	78	14	4			
				359	18	8
Secretarial Expenses:—						
Printing and Stationery ...	36	3	2			
Postage	24	19	7			
Other Expenses	15	0	0			
				76	2	9
Maintenance of Garden:—						
Wages	20	0	0			
				20	0	0
Special Expenses of Library ...				1	12	4
Subscriptions to other Societies ...				1	12	6
Cost of Wild Flower Exhibition in 1933				0	16	5

	£	s.	d.		£	s.	d.
				Cost of Vol. XXV. of Proceedings of the Society	36	14	6
				Sundries	3	5	6
				Amount of Loan Repaid ...	50	0	0
					674	2	2
				Balance carried forward ...	52	7	5
				* *See important note at foot.*			
	£726	9	7		£726	9	7

Deposit A/c. Debenture Fund.

	£	s.	d.		£	s.	d.
Balance brought forward	36	14	10	Balance on Deposit	37	6	5
Interest to Dec. 31st, 1933	0	11	7	* *See important note at foot.*			
	£37	6	5		£37	6	5

Building Fund.

	£	s.	d.		£	s.	d.
Balance brought forward	50	8	1	Transferred to Redemption Fund	25	0	0
Donations	1	0	0	Balance on Deposit	47	11	4
Proceeds of Puzzle Competition arranged by the Misses Penrose	5	13	0	* *See important note at foot.*			
Proceeds of Performance of "The Winter's Tale," by Leamor Players	14	16	6				
Interest to Dec. 31st, 1933	0	13	9				
	£72	11	4		£72	11	4

Archæological Research Fund.

	£	s.	d.		£	s.	d.
Balance brought forward	17	0	8	Donation to Maiden Castle Excavation Fund	4	4	9
Interest to Dec. 31st, 1933	0	5	5	Balance on Deposit	13	1	4
	£17	6	1		£17	6	1

Redemption Fund.

	£	s.	d.		£	s.	d.
Sum lent to the Society and now made a gift and transferred from the Building Fund	£25	0	0	Balance on Deposit	£25	0	0

G. BRUMELL,
Hon. Treasurer,
1st October, 1934.

We have examined the above accounts with the books of the Society and the vouchers for payment and certify the same to be correct.

Bournemouth,
12*th October*, 1934.

FREDERIC BROAD } Hon. Auditors.
JOHN C. WOODS }

* **Note.**—While substantial balances are shown in the cash accounts it must be remembered that there is a heavy capital debt upon the Society's premises, which, though well secured, involves the payment of a large annual sum in interest. For particulars see the Financial Note following.

Financial Note.

The amount of 4½% Debentures outstanding remains at £3,370, but the amount of Loan has been reduced to £130. The sum of £50 was repaid out of current account, and a member who had lent £25 very generously presented the amount to the Society to form the nucleus of a Redemption Fund. A new account in that name has accordingly been opened and the £25 transferred to it from the Building Fund. Donations and Legacies to the Redemption Fund, which can only be used for the paying off of Loans and Debentures, would be of great value to the Society.

During the past year the external painting foreshadowed last year has been carried out. Through the exercise of rigid economy in other directions it has been possible to pay for this without drawing on our Deposit accounts.

Report of the Botanical Section.

The Botanical Section has held 33 meetings, nine of which were lectures and discussions, including three in conjunction with other sections, and 24 field meetings, including a fungus foray in the New Forest.

The exhibition of Wild Flowers at the Free Library has been carried on as usual during the summer, when about 260 specimens were shown, including a few aliens, and 20 plants were sent in for identification.

Report of the Geographical Section.

There was a lecture almost every month in the Section during the winter session. The session began with a lecture in October on Canada by the Rev. A. H. Davis, M.A., and ended with an At Home in April, when Mr. R. K. Cardew, B.A., gave a very instructive talk on the Topography of England and Wales, followed by various interesting items. The usual Children's At Home was given early in January.

The excursion season opened, in the Geographical Section, with a trip to Sherborne and Sandford Orcas, on May 11th. At Sherborne the recently finished Lady Chapel in the Abbey was shown and described by the Custos; at Sandford Orcas, the members visited the Manor House, where they were received by Sir Hubert and Lady Medlycott, who showed them over the house and grounds. Later in the month an extremely interesting visit was paid to the new offices of the "Bournemouth Daily Echo." The Managing Director received the members, and very kindly showed them round himself. Going through the different departments the party saw how a great daily paper is produced; and the many ingenious machines which are in use. Finally, they watched with much interest the running of the huge presses on which the current issue was being printed, faster than the eye could follow.

In June a large party of the members visited the Fire Station in Holdenhurst Road, and were most kindly received by the Mayor and Corporation, and by Capt. Wall, the chief officer of the Fire Brigade. After an address of welcome by the Mayor, the Brigade, under the direction of Capt. Wall, brought out the fire engines, the fire escapes, and the other fire-fighting appliances, and gave a wonderful, indeed, a thrilling display, which was watched with intense interest by all present, and which really showed how much has been done to safeguard Bournemouth's many inhabitants. After the display the members were entertained to tea. Later in the month there was an excursion to Blandford and Purse Caundle. At Blandford, a visit was paid to the old-established brewery of Messrs. Hall and Woodhouse, where Colonel Woodhouse, the Managing Director, kindly explained the different processes in the brewing of beer. At Purse Caundle, Lady Victoria Herbert welcomed the members to her Manor House, parts of which date from the reign of Edward IV.

In July there was an excursion to Cranborne to see the Manor House and gardens, by the kind permission of the Right Hon. Viscount Cranborne. On the way the party stopped to see the Pumping Station and Water Softening Plant of the Bournemouth Gas and Water Company, by the kind permission of the General Manager. A few days later a large party availed themselves of the kind invitation of the Managing Director of the Hants and Dorset Omnibus Company to visit the Company's Works at Southampton. The members were taken in two of the Company's 'buses to Southampton, where the well-equipped 'bus station in the centre of the town and the extensive works for the repair and re-decoration of the 'buses were shown. On the return drive a halt was made at the Rufus Stone in the New Forest, where an *al-fresco* tea was most kindly provided. The hospitality and kindness of the Managing Director and his staff were much appreciated by the guests.

In August the members visited the Malmesbury and Parsons Dairy Works at Boscombe. They were received by Mr. F. Parsons, the Managing Director. Here the up-to-date plant for the automatic cleaning and filling of the milk bottles and their transport from one machine to another, untouched by hand, proved of great interest and showed the care that is taken to ensure the purity of the milk supply. Refreshments, in the form of milk and ices, were provided. The last of these excursions was to see the Corporation Baths and the Refuse Destructor. What remains of the town's refuse, after being burnt, is converted into hard slabs for use in paving and posts for fencing. Everything seems to be turned to account here, even old tins, for which, after compression by machinery, a market has now been found.

Report of the Geological Section.

Nothing of importance has been discovered during the year, but a detailed account of "The Bournemouth Skull" (found at Longham in 1932) is given in Dr. Cameron's book "The Skeleton of British Neolithic Man."

Other recent publications relating to our area are :—

(1) H. Bury. "The Plateau Gravels of the Bournemouth Area." Proc. Geol. Assoc. Vol. XLIV (1933), pp. 314-335.

(2) H. Bury. "The Geology of Bournemouth and the Isle of Purbeck." In "The Book of Bournemouth," published by the British Medical Association, 1934.

Report of the Physical Section.

Eight meetings were held, mainly devoted to modern investigations. A Lecture by Mr. R. M. Clark on "Photo-electricity" illustrated the relations of light and electricity and their practical uses in smoke prevention, sound films, burglar alarms and many other ways. Mr. Richardson gave a lucid account of the "Work of a General Analyst" in dealing with problems of manufacture involving risk to life or employment. Mr. Byard lectured on "Coal Gas and its by-products." Mr. Hemmy in two sessions expounded the present conception of the Atom and of the structure of matter. At the children's "At Home" Mr. Marsh gave a popular talk on "Fire," with many experiments. Dr. Manley's lecture, reprinted in this volume, on "Colour Changes in Hydrangeas," was addressed also to the Botanical Section. An excursion in July included an inspection of the Meteorological Station and of the R.A.F. base at Calshot. The instruments and their uses were exhibited by the operator, Mr. Zealley; and through the kindness of Wing-Commander Gaskell-Blackburn every facility was given for the inspection of different types of seaplane, the various processes of construction and repair being explained by the officers in charge. The parachute department had a singular interest.

Report of the Zoological Section.

Summary of Observations on Birds from October 1933 to October 1934

By the Rev. F. C. R. Jourdain, M.A., V.P.B.O.U., F.Z.S.

1932-33.

The following notes refer to the year 1933 and should have been included in the 1932-3 report.

Raven, *Corvus c. corax*. A pair seen several times at Hengistbury in April. The keeper states that they were carrying nesting material to a ledge on the cliff, but disappeared after the

Easter Bank-holiday. Later in the year four birds were seen there (R and S).

Hawfinch, *Coccothraustes c. coccothraustes.* One at a bird table, Boscombe, Jan. 22 (R).

Buzzard, *Buteo b. buteo.* One Sopley, April 6; one near Bransgore, April 9; a pair near Beaulieu, April 18 (R).

Hen-Harrier, *Circus cyaneus.* Female or immature bird seen near Hurn, April 12; also previously noticed by keeper (R).

Red-throated Diver, *Colymbus stellatus.* An oiled bird, Littlesea, April (R and S).

1933-34.

Two years of drought in succession have proved very destructive to our heath birds. In the New Forest alone 120 fires, involvin 1,659 acres, have been reported in the year ending June 30, 1934, and the destruction of the old gorse must be injurious to the Dartford Warblers, depriving them of covert and food. The disappearance of *Zostera marina* from our coasts has had serious effects on the wildfowl which are largely dependent on it for food. Crossbills are still absent from the district.

Raven, *C. c. corax.* No attempt to nest at Hengistbury in 1934; one seen at Mudeford, April 26 (R). Breeding as usual on the Purbeck cliffs (J). One flying over Southbourne, July 16 (J).

Hooded Crow, *C. c. cornix.* One Stanpit Marsh, Christchurch, April 7 (R); one reported killed by Rooks at West Park, Iwerne Minster, prior to April 8 (*B. Daily Echo,* 13. iv. 34).

Lesser Redpoll, *Carduelis f. cabaret.* Unusually numerous in 1934; small flock at Littlesea, April 10, 19 and 25 (R). Probably breeding, Horseshoe Common, Bournemouth (Miss Penrose); nest found with eggs near River Stour in osiers, Christchurch, May 31 (RD). Several, Heron Court, April 20 (R). Also breeding at Hursley, May 20 (J).

Crossbill, *Loxia c. curvirostra.* A fine red bird drinking at bird bath in Bournemouth, March 29 (Miss E. Trotter).

Tree-Sparrow, *Passer m. montanus.* Several at Burton, April 5 (R).

White Wagtail, *Motacilla a. alba.* Several males, Hengistbury, April 26 (R).

Firecrest, *Regulus i. ignicapillus.* A male on Hengistbury, April 13 and 14 (R and J). See *Br. Birds* xxviii, p. 28.

Pied Flycatcher, *Muscicapa h. hypoleuca.* One seen at Studland, April 28 (C. Oldham). Also one at Bournemouth on September 2 (Miss E. Trotter).

Dartford Warbler, *Sylvia u. dartfordiensis*. Much decreased in numbers on Studland Heath owing to fires; only one male seen (R). One seen on edge of harbour, Mudeford, December 22 (R). a hen on Hengistbury, January 5 (J); and two or more pairs Shirley Common, April 9 (R).

Fieldfare, *Turdus pilaris*. Forty-fifty at Avon, April 7 (R).

Song-Thrush, *T. e. clarkei*. Seen attacking lizard and swallowing its shed tail, July 16 (Miss Ansell).

Greenland Wheatear, *Œ. œ leucorrhoa*. Odd birds seen Boscombe to Hengistbury almost certainly of this race, April 14-30 (J and R). Also several Littlesea, April 28 (C. Oldham and R).

Black Redstart, *Phœnicurus o. gibraltariensis*. A male in fine plumage, Bournemouth, April 5 (F. Penrose).

Short-eared Owl, *Asio f. flammcus*. One Hengistbury, October 20-21, 1934 (P).

Peregrine, *Falco p. peregrinus*. Seen over Poole Harbour in December and April on several occasions. Also a pair seen to " change over " in mid-air over Littlesea, April 22 (R).

Hobby, *F. s. subbuteo*. A pair nesting in the Stour Valley at the end of May (RD).

Hen-Harrier, *Circus c. syaneus*. Reported by keeper near Hurn up to early March; female or immature bird flying over S. Haven peninsula, Poole Harbour, April 12 (R). Three in New Forest all the winter up to April (BR).

Heron, *Ardea c. cinerea*. The Sowley Pond Heronry was visited on May 26 and found to contain 23 nests in 18 trees, of which at least 20 were occupied (J and RD). The Wickham Herony had 15-16 nests in 1934 (P).

Mute Swan, *Cygnus olor*. Owing to the disappearance of the *Zostera* at Abbotsbury, great numbers of Swans deserted the Swannery and visited Poole Harbour, Christchurch and Southampton Water, most of them remaining through the summer without attempting to breed. At least 150 in Christchurch Harbour on March 31 (J); 250 early in April here (R).

Dark-breasted Brent, *Branta b. bernicla*. Though less numerous than the Light race, a few in Poole Harbour during December and January. They intermingled when feeding, but at times the two forms would separate, especially in flight. Not more than 8-10 seen at once. In Christchurch Harbour seven seen, December 27 (R and S).

Light-breasted Brent, *B. b. hrota*. Flocks up to 50 in Poole Harbour, December 20-January 14; much persecuted by punt gunners. Four Light and two Dark birds killed and one shot, December 27; wounded birds seen in April and flock of 25 on April 10. In Christchurch Harbour 20 seen, December 22 (R and S).

Gadwall, *Anas strepera.* One drake and two duck Gadwall at lake in Poole Park, December 14 (GGB).

Wigeon, *Anas pelelope.* Flock of well over 1,000 in Studland Bay during winter, sheltering in Poole Harbour in rough weather (R and S).

Pintail, *Anas acuto.* Four or five Littlesea, December 25; six Poole Harbour, December 28; a wounded drake, Littlesea, April 19-28 (R).

Shoveler, *Spatula clypeata.* Twenty-eight on lake, Poole Park, December 14, 20 and 31 (GGB, R and S). A pair reported Christchurch Harbour, early April; two drakes and one duck there April 7 (R).

Pochard, *Nyroca f. ferina.* Twenty-five to thirty Poole Park, December 14 (GGB); 12 Christchurch Harbour, December 22, and about 20, January 16 (R).

Tufted Duck, *N. fuligula.* Ten or twelve Poole Park, December 14 (GGB); 20-30 at sea, Hengistbury, January 13; about 60 Christchurch Harbour, January 16 (R).

Goldeneye, *Bucephala c. clangula.* One " Brownhead," Littlesea, January 3; others, including adult drake, Poole Harbour, January 14 (R).

Velvet Scoter, *Oidemia fusca.* Two drakes off Southbourne, December 22; two Christchurch, December 27; 15 off Hengistbury, December 30; 15 Mudeford, January 2 and 13 (R and S).

Goosander, *Mergus merganser.* A female " Sawbill," probably this species, near Ibsley Bridge, December 18 (BR).

Red-breasted Merganser, *Mergus serrator.* In some numbers (up to 50-60) off shore and in Poole Harbour, December and January (R and S); one off Hengistbury, April 3 (R).

Cormorant, *Phalacrocorax c. carbo.* Birds with white thigh patches seen in Poole Harbour, December 20 and 25 (R).

Great Crested Grebe, *Podiceps c. cristatus.* About 12 in Studland Bay and a few near harbour mouth, December 31; several Sandbanks, January 14; also assuming summer plumage, Studland Bay, April 4 and 6 (R and S).

Black-necked Grebe, *P. nigricollis.* At least a dozen, Poole Harbour, December 31 (R and S).

Great Northern Diver, *Colymbus i. immer.* Several off shore, Branksome to Poole, December and January; one to three in summer plumage, Branksome Chine, April 4-19 (R. and S). One in Christchurch Harbour, April 7 (J).

Red-throated Diver, *C. stellatus.* An adult dead in Poole Park in January (KC); one Studland Bay, winter plumage, April 27 (C. Oldham).

Wood-Pigeon, *Columba p. palumbus.* A strong migratory movement from S.W. at 8.30 a.m., February 3, reported from Boscombe (E. Brown).

Oyster-Catcher, *Hœmatopus o. occidentalis.* Five, Mudeford, September 14, 1934 (KC).

Kentish Plover, *Charadrius a. alexandrinus.* One, South Haven Peninsula (R and Dr. A. C. Coles), April 27; two at Mudeford, April 30 (R and RD). See *Brit. Birds*, xxvii, p. 53.

Dotterel, *Charadrius morinellus.* Six seen at Blackmoor, near Ibsley Common, May 13 (H. Ringrose).

Grey Plover, *Squatarola squatarola.* About 30 Poole Harbour, December 28-29; also several December 31, January 3 and 14 (one) (R and S); 8-9 Keyhaven, May 12 (BR).

Lapwing, *Vanellus vanellus.* Great migration seaward from Hengistbury between December 10 and 20 (Brewer).

Turnstone, *Arenaria i. interpres.* One Christchurch Harbour, May 11-14; five September 2 (P and J).

Sanderling, *Crocethia alba.* About six seen at Mudeford from December 27 to May 27 (R. and J). Four, Poole Harbour, April 27 (R).

Knot, *Calidris c. canutus.* Twenty to thirty, Poole Harbour, January 14; one Christchurch Harbour, January 13 (R); nine Hengistbury, September 24 (P).

Purple Sandpiper, *C. m. maritima.* One Poole Harbour, January 14 (R).

Green Sandpiper, *Tringa ochropus.* One Poole Harbour, December 27 (R and S); one Mudeford, April 5 (R).

Avocet, *Recurvirostra avosetta.* Two, Keyhaven, July 30 (BR).

Bar-tailed Godwit, *Limosa l. lapponica.* Forty to sixty Poole Harbour, December 20-January 14; 12-15, April 4; several, April 10 (R); three, Keyhaven, May 12 (BR).

Whimbrel, *Numenius ph. phœopus.* A very early bird, Poole Harbour, April 6 and 10; no more seen till April 29, becoming fairly common (R).

Sandwich Tern, *Sterna s. sandvicensis.* One, Branksome Chine, April 4 (R).

Lesser Tern, *S. a. albifrons.* The Mudeford colony flourishing; about 14 pairs, but the other Hants colony much reduced, only two pairs 1934 (J and RD).

Black-headed Gull, *Larus ridibundus.* A large colony among *Spartina* grass at Keyhaven, but the smaller Avon Common colony, though inhabited in 1933, was said to be abandoned in 1934.

Great Black-backed Gull, *L. marinus.* Fourteen seen flying in a line to Christchurch Harbour, April 3 (R).

Iceland Gull, *L. leucopherus*. One off Branksome Chine, April 6 (R. cf. *Brit. Birds* xxviii, p. 29).

Water-Rail, *Rallus a. aquaticus*. One Poole Harbour, December 29; one Christchurch, December 30; also heard, January 2 and April 3 (R and S).

Coot, *Fulica a. atra*. 550 counted in Christchurch Harbour, December 15 (T).

ARRIVAL OF MIGRANTS, 1934.

The most remarkable feature was the early arrival of a small party of Swifts about a fortnight in advance of the main body.

Tree-Pipit. April 9th (Hurn, R).

Yellow Wagtail. April 11th (Avon Valley, R; Southbourne, T); 13th (Avon Valley, many, P).

Spotted Flycatcher. May 11th (Swanmore, F); 16th (Southbourne, J).

Chiffchaff. April 2nd (Southbourne, T); 3rd (Hengistbury, R; Southbourne, J); 4th (Studland, R).

Willow-Warbler. April 7th (Yarmouth, F); 8th (Studland, R); 11th (Avon Valley, R).

Wood-Warbler. April 22nd (Ringwood, Ponchand, Ronnhams, J); 28th (Studland, R).

Grasshopper-Warbler. April 25th (Studland Heath, R).

Sedge-Warbler. April 17th (Stour and Avon, R); 21st (Southbourne, T); 22nd (Studland, R).

Garden-Warbler. May 3rd (Southbourne, J; Lymington, F).

Blackcap. April 10th (Droxford, F); 29th (Southbourne, J).

Whitethroat. April 10th (Sowley, F); 15th (Studland, R); 16th Southbourne, T, P); 17th (Stour and Avon, R).

Lesser Whitethroat. April 16th (Southbourne, T); 30th (Lymington, F).

Wheatear. March 29th (Hengistbury, P, T; Needles Down, F); April 3rd (Hengistbury, numbers, R); 4th (Studland, R).

Whinchat. April 28th (Studland, R).

Redstart. April 16th (Hengistbury, P, T); 29th (Studland, R).

Nightingale. April 15th (Swanmore, F); 17th (Sowley, F); 18th (Mudeford, T).

Swallow. April 6th (Studland, R; Yarmouth, F); 7th (60—10, Winkton, R); 10th Hengistbury, P; Sowley, F); 11th (Southbourne, T).

House-Martin. April 15th (Eversley, F); 16th (Yarmouth, F); 20th (Winkton, R).

Sand-Martin. April 7th (Winkton, R; Southbourne, T); 12th (Studland, R); 14th (Southbourne, P).

Swift. April 17th (Harbridge, one, BR); 20th (Bournemouth, one, KC; Rownhams, H. P. Wilson); 22nd (Kings Sombourne, F); May 2nd (Christchurch, P; Southbourne, T).

Nightjar. May 8th (Swanmore, F); 13th (Hengistbury, T); 18th (Wickham, P).

Wryneck. May 25th (Bournemouth, M. Penrose).

Cuckoo. April 4th (Swanmore, F); 8th (Studland Heath, R); 11th (Romsey, F); 14th (Lymington, F); 16th (Hengistbury, P; Mudeford, CT; Sowley, F; Bournemouth, R).

Turtle-Dove. April 20th (Southbourne, J); 29th (New Milton, F); May 2nd (Southbourne, T).

Sandpiper. April 23rd (Mudeford, R); 25th (Studland, R).

Corncrake. May 9th (Sopley, F)—(one at Headley Down, N. Hants, on April 7th, H. T. Gosnell).

The following abbreviations are used:—R = K. B. Rooke; S = K. D. Smith; F = recorded in the 'Field' by M. Portal (Swanmore), R. H. C. Baker (Kings Sombourne), Miss P. E. G. Harding (Sowley), Lt.-Col. H. G. Thomson (Yarmouth), etc.; P = Miss C. Popham; BR = B. J. Ringrose; J = F. C. R. Jourdain; T = C. E. Tucker; GGB = G. G. Borrett; RD = R. Dobson; KC = Miss K. Chilvers; to all of whom the recorder returns grateful acknowledgments.

Library Report.

The Library continues to increase both in the number and in the diversity of the volumes on its shelves. There are now works on every branch of science; and these are, undoubtedly, a great asset to the Society.

The many weekly and monthly publications which have been so regularly presented to the Library are much appreciated by quite a number of readers. The Hon. Librarian has much pleasure in thanking the donors, and trusts that they may long continue these contributions.

The usual exchange of the Society's annual volume of Proceedings for the Proceedings and Reports of other Societies both at home and abroad has been made, and has resulted in a further acquisition by the Library of several useful publications. These are left on the library table for a month, as a rule.

A few important works have been purchased; on the other hand, there are some duplicate and other volumes for sale.

British Association.

The Conference of Delegates of Corresponding Societies was attended by our representative, Mr. A. S. Hemmy, during the meeting of the Association at Aberdeen.

The President of the Conference, Sir Henry Lyons, in the course of his address, urged the importance of the organisation of existing scientific resources by close co-operation between museums, libraries and scientific societies. The recent drought gave added interest to a paper by Sir Albert Kilson on " Well-sinkings and borings," in which he suggested that geological observations might be made by local Societies and forwarded to the Geological Survey.

Other papers were contributed on " Population Maps," " Town and Country Planning " and " National Parks." In the last the Cairngorms received special commendation, but the claim of the New Forest was not entirely disregarded.

S.E Union of Scientific Societies.

The 39th annual Congress was held at Reading in July, and was attended by our Delegate, Mr. S. Whitaker. At the opening reception by the University, the newly inducted President, Professor Hawkins, delivered his address on " Fossils and Man." A notable lecture, illustrated by colour slides, was given by Professor Poulton on " The power of changing colour as a form of protective resemblance." An afternoon was spent in visiting the Abbey, the Art Gallery and the Museum, where special interest attached to the ancient town Charter, a replica of the Bayeux tapestry, and a large collection of objects unearthed during excavations at Silchester.

Lighter entertainment was provided by a Mayoral Reception and by numerous excursions, notably to Uffington, where the White Horse and Wayland Smith's cave formed the subjects of short addresses by the local leader, Mr. Seaby.

Next year the Congress will be held at Bournemouth under the auspices of our Society and the Municipal authorities.

Presidential Address.

Discovery of the Solar System.

By Sir Frank W. Dyson, late Astronomer Royal.

I have had some hesitation on the choice of my Address to you to-day. Astronomy has so many attractive subjects. I might have told you of the constitution of the stars—great globes of gas with internal temperatures of many millions of degrees; how this heat is absorbed by successive layers till at the surface the temperature is only a few thousand degrees, and is yet sufficient to radiate vast quantities of energy without sensible diminution in many thousands of years. Or again, I might have told you of the vast extent of our galactic system and the evidence that the Sun and stars near us are moving round its centre at the rate of 150 miles a second, but will take from 200 to 250 million years to make a complete circuit. Or again, I might have told you of the Spiral Nebulae, great galaxies of stars, of which the nearest is so distant that light takes nearly a million years to reach us; that these galaxies extend in all directions and are scattered in space further than the largest telescopes can reach; and most extraordinary of all, were fairly near together 2,000 millions years ago.

But instead of this I propose to give you a very brief résumé of the history of Astronomy till the Solar System was definitely established. It is well worth remembering what a debt the world owes to Astronomy in the development of Mathematics, in the foundation of Dynamics, and in the freedom of thought which in this country at least we all enjoy.

The time when regularity in the movements of the stars was first appreciated is lost in antiquity. Many centuries before the Christian Era, the Chinese, the Chaldeans and the Egyptians studied the stars. Their regular movement night by night across the sky was seen to be like a great globe turning uniformly on its axis. Its period of revolution was approximately a day. In the course of this movement the stars retained their relative positions; and different constellations received names. When you see Orion whether rising or setting or due South, or whether you look at it in November or March, it is just the same and will be if you live to be a hundred.

When you look to the North, you see all the stars, including the Great Bear, turning slowly about the pole star; and the Great Bear looks pretty much as it did 2,000 years ago. You will remember how Julius Caesar said, "I am constant as the Northern Star." In Shakespeare's time at any rate the same star as at present was near the axis on which the great globe of stars appeared to turn.

But there are a few stars, and these some of the brightest, which are not fixed, and so to speak crawl across the sky. The most conspicuous among the crawlers is the Moon. On consecutive nights it moves 13 degrees Eastward among the stars, taking 27 days to complete its circuit of the sky. The other crawlers which have been noticed from time immemorial are five bright stars—or what appear to be stars—now called planets. They are Mercury, Venus, Mars, Jupiter, Saturn.

Mercury and Venus never get very far away from the Sun. We don't often see Mercury in this country. But when we see Venus, it is the Evening star which we see after Sunset—and at other times the Morning star seen before Sunrise. It is said to be the old Greek philosopher Thales who first declared the identity of the Morning and Evening star.

There is another crawler on the face of the sky—the most important of all—the Sun. If it were not for the atmosphere which scatters the sunlight we should see the stars in the daytime, and actually we can see many of the brighter ones in a telescope. We should notice that the Sun moves just over I degree a day, taking a year to complete its circuit of the sky. This is why we see different stars at different times of the year. This movement of the Sun makes the stars rise four minutes earlier each night. In a month this amounts to two hours, so that we get a regular change of Constellations when we look South, and when we look North see the Great Bear low down in the sky at midnight in November and near the Zenith in April.

The Greeks put all these facts together and made the Science of Astronomy. I don't say the observations came originally from the Greeks, but their mathematical genius brought all the facts into harmony. The Moon and Planets were found to move in a particular belt of Constellations called the Zodiac. Some of these, like Gemini, Cancer and Leo, are high in the sky while Scorpio and Aquarius are low down. Further the Sun, by carefully plotting its position among the stars near Sunrise and Sunset, was found to move in a great circle in the middle of the Zodiac. The great circle half way between the poles is the Celestial Equator. All stars on it rise due East and set due West, and rise to the same height when they are due South. The circle inclined at 23½ degrees to the Equator is the Ecliptic, the Sun's annual path. The Bull and the Twins are the highest points, and the lowest are Scorpio and Sagittarius.

When the Sun is 23½ degrees N. on June 22nd, we have midsummer, as it rises early and sets late; and on December 22nd it is 23½ degrees S., and rises late and sets early. This is, of course, the explanation of the seasons, the movement of the Sun across the sky in the Ecliptic.

The Moon moves in a gradually changing circle near the Ecliptic in a month.

The motion of the Planets, however, is irregular—now forward, now backward. To explain this, the Greek astronomer had recourse to a system of epicycles and eccentrics, which did fairly well account for the observed movements of the heavenly bodies. The length of the year was determined with great accuracy, and the phases of the Moon recognised as depending upon its angular distance from the Sun.

They knew from quite early times that the Moon was much nearer than the stars to the Earth, and that it sometimes intervened and caused an Eclipse. Also that an Eclipse of the Moon was caused by its passage into the shadow thrown by the Earth. Who discovered this we don't know, but he must have been gifted with a great power of imagination. Perhaps seeing shadows of the clouds suggested to him that the Earth would cast a shadow just as the Moon did. Following up this idea, it was clear that the shadow was circular, and the logical consequence was that the Earth was a round ball.

Eratosthenes, who was born in 272 B.C., measured the size of the Earth. He found that the Sun was vertically overhead at Syene—Assouan: but that at Alexandria to the North of Syene it was so far South that it cast a shadow of a vertical rod 1/50th part of its length. He knew that the sun was so distant that it should really be in the same direction seen from the two places, and attributed the apparent difference of direction to the curvature of the Earth. He measured the distance from Syene to Alexandria, and multiplying by 50 obtained the circumference of the Earth. The result he obtained was 252,000 Stadia. We don't know certainly the length of a Stadium, but according to Pliny the result was 31,500 Roman Miles or just under 29,000 English Miles—not too bad for a first shot.

Hipparchus, who lived about 150 B.C., used the apparent diameter of the Earth's shadow to determine the distance of the Moon. Assuming that the Sun was much more distant than the Moon, he found the distance of the Moon to be 60 times the Earth's radius, or 240,000 miles, which is correct. The distance of the Sun he took to be 30 times this. These were only some of the great discoveries of Hipparchus, who is generally regarded as perhaps second to Newton among the great Astronomers.

Greek Astronomy was summed up in a great work by Ptolemy, who lived in the Second Century A.D. His book was called by the Arabs the Almagest—i.e., the Greatest. For 1,400 years it was an Astronomical Bible, and was a magnificent monument of Greek Astronomy. The Greeks made it the Queen of the Sciences.

For many years Astronomy was neglected except by the Arabs and Persians. They made more exact observations and corrected in detail some of the calculations in the Almagest for which they had almost a superstitious reverence. The work was translated into Latin in the thirteenth century, and so found its way into Western Europe.

A new era opened with Copernicus. He was born in 1473, and Germany and Poland both claim him. In 1496 he became Canon of Frauenburg, and in an active life of administrative work found time to cultivate Astronomy. He is said to have completed his work " De revolutionibus orbium coelestium " in 1530, but did not publish it till just before his death in 1543. Many of his arguments are very fanciful, but he was quite clear on the points that the diurnal rotation of the stars could be explained by rotation of the Earth in the opposite direction : that summer and winter were explained by the inclination of its axis to the plane in which the Earth moved round the Sun : and that such a motion would explain the main part of the Epicyclic Motion of the Planets. He notices that the idea of the Earth's rotation and revolution round the Sun had formed part of the speculation of Greek Astronomers, though they had not found favour with Hipparchus and Ptolemy. The secondary Epicycles and Eccentrics which the Greeks found necessary for a true representation of the movement of the heavenly bodies he retained. The order of distances of the Planets agrees with the Greek Astronomers.

The book made a great sensation. It was contrary to common sense, the teaching of Aristotle and Ptolemy, and also to the teaching of the Church and the Bible.

Why did we not feel the motion?

Why were the clouds and atmosphere not left behind?

Why was not the Moon left behind, if the Earth went round the Sun?

Lastly, if the Earth moved round the Sun, why were the Constellations unchanged in the course of the year? Surely such a change of view-point ought to have an effect.

Some of these questions were not at all easy to answer, but we shall see how in course of time they were resolved.

In 1546, three years after the death of Copernicus, the great Danish Astronomer Tycho Brahe was born. He was an observer, as contrasted with a theorist. He made great improvements in Astronomical instruments and consequently in the accuracy of observations; he also realised the importance of long series of observations. He was not a believer in the Copernican system, but his observations furnished the key to the true movements of the Earth and Planets. His long series of observations were given by him to his pupil Kepler.

Kepler was a most indefatigable calculator. Remember, he had no logarithm tables or aids in his arithmetic. When he tried one hypothesis and it failed to represent Tycho's observations, he said " God did not make such an observer as Tycho for nothing," and his hypothesis could not be correct. So he started afresh and after years of labour discovered the true laws of planetary motion.

(1) That all the planets move in Ellipses, having the Sun in one focus of the Ellipse.

(2) The straight line joining the Planet to the Sun sweeps out equal areas in equal times.

These two famous laws were published in 1609 and swept away the need for the numerous Epicycles and Eccentrics required to represent the motions of the heavenly bodies in accordance with Tycho's very accurate observations.

Ten years later he published a third law.

(3) The square of the time of revolution of any planet about the Sun is proportional to the cube of its mean distance from the Sun.

By the aid of these famous laws Kepler was able to publish Tables which gave means for predicting the positions of the Planets with far greater accuracy than any up to that time. Kepler's life was one of extreme poverty. Sir Henry Wotton, the English Ambassador at Venice in 1620, tried to persuade him to come to England, where his great scientific reputation would secure him a welcome and freedom from financial worries. But Kepler would not leave his own country. He died in 1630; an heroic soul, always loyal to his old Master Tycho, and modest of his own great discoveries.

In 1564 Galileo was born. At the age of twenty-five he became Professor of Mathematics at Pisa, and from the Leaning Tower showed that a large body and a small body would fall in the same time, contrary to the doctrine of Aristotle. Galileo is generally accepted as the founder of Dynamics, but I must only speak of his Astronomical discoveries. Although there may be earlier claimants to the discovery of the telescope, Hans Lippershey of Middleburg must be credited with its first practical creation. On October 2nd, 1608, he presented one to the States General. The news of the discovery spread, and telescopes were being sold in Paris the following year. Galileo, hearing about the discovery, realised the principles which underlay it, and soon made a telescope for himself. This he took to the highest bell-towers in Venice and " showed many gentlemen and senators ships at sea making sail for the mouth of the harbour. The effect of the instrument is to show an object at a distance of say fifty miles as if it were but five miles." I am sorry to say that some of the earliest suggestions for the use of the instrument were its value in war; but Galileo put his invention to a nobler service by applying it to examine the Sun, Moon and stars.

The result was a mine of astonishing discoveries which demonstrated the truth of the heliocentric or Copernican theory. Taking the discoveries (but not in the exact order in which Galileo made them), the principal are

(1) Examination of the Sun showed spots on its surface, which moved from day to day and showed clearly that the Sun rotated.

If the Sun rotated, why should not the Earth?

(2) Pointing on the Moon, he saw what he took to be mountains and seas. As Milton puts it, he descried " Mountains and rivers in her spotty Globe."
His interpretation was not exactly right, but at any rate the Moon was not the crystal sphere of the ancient philosophy.

(3) Pointing on the Pleiades he saw many more stars than with the naked eye and found the Milky Way, an innumerable host of stars.

(4) Pointing on Venus—he saw that it had a disc, and also phases, like the Moon. He concluded that it shone by reflected light from the Sun.

(5) Perhaps the most important of all his discoveries was that of the Satellites of Jupiter. On January 7, 1610, he saw that Jupiter had three little stars, small but very bright, near to it, two on the East, one to the West, and thought they were fixed stars. " But on the following night, led by some fatality," he says, " I turned on the same part of the sky and found a very different state of things, for there were three little stars all West of Jupiter and nearer than on the preceding night. At this point although I had not turned my thoughts at all upon the approximation of the stars to one another, yet my surprise began to be excited, how Jupiter could one day be found to the East of all the aforesaid little stars when the day before it had been West of two of them; and forthwith I became afraid lest the planet might have moved differently from the calculations of Astronomers and passed the stars by its own motion. I therefore waited for the next night with the intensest longing, but was disappointed, for the sky was covered with clouds in every direction." On January 10, two stars were seen to the E. of Jupiter. By January 13 he had made up his mind that Jupiter had four Moons, revolving round him just as our Moon revolves round the Earth.

Here then was an answer to another difficulty of the Copernican system. Jupiter's Moons accompany him in his great orbit round the Sun. Why should not our Moon accompany the Earth in its orbit?

Galileo probably believed in the heliocentric or Copernican system before he made these amazing discoveries. Kepler had appealed to the learned by his Mathematical discoveries. But Galileo's telescope brought the doctrine to the man in the street. In 1611 he published a book on the Movement of Sun Spots, in which he boldly asserted the Copernican theory. He was told that this was contrary to the Scriptures and in 1616 promised the Pope that he would not " hold, teach or defend " this doctrine. In 1632 he broke this pledge and published a very lively book " On the two systems of the world " in the form of a dialogue between a Copernican Astronomer, a Ptolemaic Astronomer, and a third well-meaning but stupid supporter of the Aristotelian School. Unfortunately Pope Urban VIII., formerly Cardinal Barberini, was led to believe that Galileo had satirized him in the person of the third character. Galileo was brought before the Inquisition, and had to recant. He was condemned to imprisonment; but the sentence was commuted by the Pope into permission to live at Arcetri near Florence. He was turned seventy; but he went on with his scientific studies, and made the discovery of the Moon's librations shortly before he became totally blind in 1637. He died in 1642 and was buried in Santa Croce, the Pantheon of Florence. It must be said that his biting satirical tongue contributed to his troubles.

By the middle of the 17th century the Copernican system was adopted by many educated men. Milton, if we may judge from the verse in "Paradise Lost,"

> " Whether the Sun, predominant in Heaven,
> Rise on the Earth, or Earth rise on the Sun"

leaves it a perfectly open question, but from many passages we may infer that he held the Copernican view, though for poetical reasons he chose the Ptolemaic system for his poem. Hobbes and Descartes accepted it. The young astronomer Horrox realised the importance of Kepler's laws, and he and his two friends Crabtree and Gascoigne (who all died before 1650) were convinced of the truth of the heliocentric system of Copernicus.

On December 25, 1642, the year in which Galileo died, Newton was born. He went to school at Grantham and on June 5, 1660, was enrolled as an Undergraduate at Trinity College, Cambridge. He became a Fellow of his College in 1667, and his reputation as a Mathematician and Natural Philosopher was so great that he was appointed Lucasian Professor of Mathematics in 1669. His earliest achievement was the detection of the composite character of light, and other optical problems. But in 1666 he turned his attention to the subject of gravitation. Voltaire tells the story which he had from Newton's niece that he was sitting in his garden at Woolsthorpe when the fall of an apple set him thinking. The story may be mythical, but it will serve us to try and find out Newton's train of thought. What is the cause of the weight or gravity of the apple? *Answer.* A pull towards the Earth. *Question.* Will the apple fall equally, if the tree is in New Zealand or anywhere else on the Earth's surface? Certainly. *Q.* Then the attraction is towards the Earth's centre? Yes. If the apple is 100 miles high, will it fall to the Earth? Yes, with increasing velocity till it strikes the ground. If it were as distant as the Moon, would it still be attracted to the Earth, and would the attraction be diminished in amount? What would be the law of this diminution? Newton assumed the attraction on the apple to be inversely as the square of the distance from the Earth's centre. If twice as far, the attraction will be $\frac{1}{4}$ and so on. This is just how the intensity of light diminishes as the distance increases, and so it is a very natural law to assume.

Then Newton asked himself, is this gravity the force which keeps the Moon revolving round the Earth, just as a stone can be whirled round at the end of a string and the tension of the string makes an inward pull? When he allowed for the diminution, according to the distance of the Moon from the Earth's centre, he found by calculation, using the dynamical laws which he had developed, following Galileo, that this was the right amount.

He then showed that if the Sun attracted the Planets according to this law they would move in ellipses, and would obey the famous laws of Kepler. This was, I think, his next step.

Then he must have said to himself, this attractive force which belongs to apples and the Moon and the Sun and the Planets must be a property of all matter, and so he is led to a law of Universal Gravitation that every particle of matter attracts every other with a force varying as the product of their masses, and inversely as the square of the distance between them.

He then found himself up against a very difficult mathematical problem. If the Earth is divided up into millions of particles, and they are all pulling one another, what will be the total effect? He showed that the attraction of a uniform sphere would be the same as if all its mass were concentrated at its centre. It is easy to believe this for two very distant bodies like the Earth and the Moon; but it was a very brilliant achievement in Mathematics to show that the attraction of the whole Earth on a body near its surface was the same as if all the particles in the Earth were concentrated at its centre. So it is the pull of the Earth which gives the apple its weight or gravity, and this pull will diminish inversely as the square of the distance from the Earth's centre.

Newton did not publish his discovery till 1687. It is said that his calculation of the pull of the Earth on the Moon did not come out exactly right, because the size of the Earth was not sufficiently well known. I doubt whether this is correct. Possibly he had not solved the difficult problem of the attraction of a sphere on a body fairly near to it. Also the "Principia" contains so many applications of the law of gravitation that he must have taken years to work out all its developments. The "Principia" was not published till 1687, in consequence of Halley's visit to Cambridge, who persuaded Newton to agree to its publication.

Let us consider some of the consequences which Newton deduced from his famous law. In the first place it gives us a means of determining the Masses of the heavenly bodies. The sum of the Masses of two attracting bodies is proportional to the cube of their distances apart divided by the square of their times of orbital revolution. This is the interpretation of Kepler's third law, when we regard the Masses of the Planets as small compared with the Mass of the Sun.

Knowing that the Earth goes round the Sun in a year, and the Moon round the Earth in a month, combined with the relative distances of the Sun and Moon, we find that the Mass of the Sun is 1,300,000 times the Mass of the Earth and Moon. From the distances and times of revolution of the Satellites of Jupiter we obtain its mass. In a more complicated manner we find that the Mass of the Earth is rather more than 80 times that of the Moon.

Newton showed, too, that comets were members of the Solar System, and that their movements could be predicted. In some cases they are found to return after long intervals, like Halley's of about 75 years, after their excursions in very long ellipses.

It would hardly be possible without some severe mathematics to explain the many phenomena which were explained by the law of gravitation, and I shall only recapitulate the most important.

(1) The Shape of the Earth: Newton showed that the rotation combined with gravitation would cause the Earth to bulge out at the Equator. This was shortly afterwards verified by French scientists.

(2) The phenomena of the Tides were explained as caused by the attraction of the Sun and Moon, Spring Tides following New and Full Moon and Neap Tides in the Quarters.

(3) A change in the direction of the Earth's axis causing the Precession of the Equinoxes, discovered by Hipparchus in 150 B.C., was shown to arise from the attraction of the Moon and Sun on the protuberant matter near the Earth's Equator.

(4) The main features of the very complicated motion of the Moon were explained in detail as arising from the disturbing action of the Sun's Gravitation.

Laplace, the greatest of Newton's successors as a Mathematical Astronomer, says of the "Principia" that it is pre-eminent above all the production of the human intellect. There is a well-known couplet of Pope's—

" Nature and Nature's laws lay hid in night.
God said ' Let Newton be ' and all was light."

Owing to his genius all the phenomena of the movements of the Planets, the Moon, the Earth and Seas were brought into a grand harmony.

While Newton was making these immortal discoveries French astronomers made a determination of the distance of the Sun. Hitherto the Solar system had been like a map with a very imperfect scale. The relative distances of all the Planets were accurately known; but the actual distance required a knowledge of the distance from the Earth to the Sun. Cassini sent an expedition to Cayenne in S. America, to observe Mars when it was nearest to the Earth. Similar observations were made at Paris. By exact observations of the position of Mars among the stars at the two Observatories the distance was calculated. The result was

83 million miles. Later observations give 92,800,000 miles, and I suppose this is correct to at least one part in 2000.

Although Newton had shown that the main facts of planetary and lunar movements were explained by the law of gravitation, a large number of minor movements and inequalities were left over. This task involved a development of mathematical analysis, mainly due to great French analysts. The interaction of the Planets on one another is a complication which produces small but observable results. For example:—although the Planets are moving in ellipses round the Sun, the positions of the Nodes, i.e., the points where their orbits cut the plane of the Ecliptic, have a slow motion, and the ellipses themselves very slowly revolve in their own planes. In the course of 200 years the theoretical results from the law of gravitation have been shown to agree with the most exact observations except in two cases.

The Moon has one quite small irregularity still unexplained. In the last 200 years it has never diverged more than 1/100th part of its apparent diameter from the position assigned to it by gravitational theory. Some Astronomers think this may be caused by infinitesimal variations in the Earth's speed of rotation.

The other divergence is an unexplained motion of 42 seconds a century in the perihelion of Mercury. The ellipse in which Mercury moves round the Sun is turning slowly. Actually it is moving 574 seconds a century, i.e., one-third of the diameter of Sun or Moon, while the action of all the Planets on it accounts for only 532 seconds.

The genius of Einstein has produced a new theory of gravitation, which explains this difference, and does not make any perceptible alteration in the movements of the other Planets. I cannot enter into other phenomena which Einstein's theory is able to explain.

Returning to the telescopic discoveries:—After Galileo's discovery of the four Satellites of Jupiter he nearly discovered the Ring of Saturn. He found two appendages on each side of Saturn which he could not understand, and after a time he lost them, and then they reappeared, to his great perplexity. In 1655 Huyghens discovered that the Planet had a ring round it. In the same year he found that the Planet had a Satellite, which he called Titan. Other Satellites were discovered later by Cassini about 1700.

In 1781 Uranus was discovered by William Herschel. This was the first addition to the planets from time immemorial.

In 1846 two astronomers—Adams and Leverrier—working mathematically on a slight deviation of Uranus, concluded that there must be an exterior planet, and showed where in the sky it was to be looked for. It was duly found on September 26, 1846, by Galle in Berlin. The tablet in Westminster Abbey in memory of Adams has the inscription "Neptunum calculo monstravit."

Only a few years ago a still more distant planet named Pluto, no larger than the Earth, was found at the Flagstaff Observatory in Arizona by Dr. Tombaugh, in consequence of a search instituted by Dr. Lowell.

We may sum up by saying that the Sun with a mass 330,000 times that of the Earth controls the movements of its large family of planets, and supplies them with heat and light, in very different amounts owing to their different distances. The following table gives the members of this family, their distances from the Sun being given in proportion to that of the Earth (i.e., 93 million miles), and their periods of revolution in years.

The Solar System.

Planet.	*Mass.*	*Distance.*	*Period.*	*Satellites.*
Mercury ...	0.04	.39	0.25	None
Venus ...	0.81	.72	0.62	None
Earth ...	1.00	1.00	1.00	The Moon
Mars ...	0.11	1.52	1.88	2 small
Minor Planets—about 2,000 small bodies.				
Jupiter ...	317	5.20	11.86	4 large; 5 small
Saturn ...	95	9.54	29.46	1 large; 8 small
Uranus ...	15	19.19	84.01	4 small
Neptune ...	17	30.07	164.79	1 large
Pluto ...	0.1	40.	250.	None

I think we shall admit that the discovery of the Solar system is a very glorious one. It took over 2,000 years from the time the Greek astronomers found regularity in these moving points of light, till Newton showed how all was comprehended in the law of gravitation. It has been brought about by careful observation of the facts, mathematical achievement of the greatest brilliancy in their interpretation, and the invention of new instruments of research—the telescope and the spectroscope.

In conclusion we can say with the Psalmist, " O Lord how manifold are Thy works " but may add that the mind of man is the most marvellous of them all.

Selected Papers.

"Some Experiments with Hydrangeas."

By J. J. Manley, M.A., D.Sc. (Oxon.)
(Fellow of Magdalen College, Oxford).

Of the many flowering plants to be seen in the gardens of Bournemouth, that which makes an insistent appeal is the hydrangea. This not only because of the dissimilarity in the colour of the flowers of different plants, but also on account of the somewhat unexpected colour variations which from year to year may occur in the flowers of any selected plant.

Inquiry shewed that there is a widespread belief that the colour of hydrangea flowers is largely dependent upon the amount of iron present in the soil; and so, with the object of deepening the colour, some growers place iron nails within the soil about the roots. It may be observed that both belief and practice are in accord with the results obtained by Professor R. Robinson and his pupils during their researches upon the anthocyanins: compounds which are responsible for many of the colours found in various flowers.

With the object of still further elucidating the influence of iron upon colour, four hydrangeas, which during the preceding summer had produced pink flowers, were planted in a row in one and the same kind of soil, the distance between plant and plant being approximately 4ft. Two of the plants were allowed to grow and develop under prevailing conditions, whilst the others were additionally influenced by simple voltaic couples. These couples were prepared and used in the following way.

First, one end of a stout copper wire was repeatedly doubled so as to form a multiple limb: the other end was then secured to the head of a bright iron bar. The multiple limb of copper and the iron bar were each six inches long. Next, the single and central portion of the wire was so bent that the whole combination formed an inverted U. Finally, the two limbs of the inverted U were thrust vertically down into the soil containing the roots of the plant, the iron limb being on one side and the copper limb on the other. Thus iron was continuously added to the soil enveloping the roots, and a weak and variable current of electricity maintained. By opening the circuit and inserting a suitable ammeter, the strength of the current could at any time be measured, and the rate at which iron was being taken up by the soil calculated. In this way it was found that for very wet soil, the added iron amounted to 2 mg. per 24 hours: whilst for soil usually termed dry, the quantity of added iron was, during a like period, not more than .04 mg. or 1/50th of that noted for wet soil. Assuming the distribution to have been uniform throughout the 1 c. ft. of soil containing the roots, the added iron approximated to .001 mg. per 1 c. inch in the first case, and to .00002 mg. in the second. It is perhaps surprising to find that quantities of iron of such small orders as these can and do, as we shall presently shew, bring about the observed marked differences in colour.

During the growth and development of the flowers of the four experimental plants, preliminary analyses were made of earlier flowers taken from other plants. Thus it was found that in addition to water, the fully developed flowers contained silica, iron, aluminium, calcium, magnesium, sodium, potassium and phosphoric acid. Other constituents not looked for were probably present. For our investigation, the quantitative analysis was restricted to determinations of water, ash, silica, iron discovered (*a*) in combination with silica, and (*b*) in other compounds. These initial experiments indicated that the total iron content varied within the limits of .002 and .003 per cent. : in other words 100 grms. of flowers yielded from 2 to 3 mg. of iron. In general, use was made of 20 grms.; but in some few instances not more than 2 grms. of flowers were available. Hence instead of the 2 or 3 mgs. just mentioned, we were in the first case called upon to measure from 4/10—6/10 of 1 mg., and in the second from 4/100—6/100 of 1 mg. of iron. The determination by direct weighing of quantities so small being a matter of considerable difficulty, recourse was had to tintometry, the principle of which is extremely simple.

Tintometry is based upon the fact (*a*) that some compounds are deeply coloured, and (*b*) that the depth of the colour is directly proportional to the amount present in solution. Accordingly, the iron to be measured is first suitably dissolved and the resulting solution appropriately treated for the production of some highly coloured substance. For our present purpose the coloured substance was Prussian blue. The delicacy of this method was found to be such that 1 part by weight of iron in 8 million parts by weight of water could be detected and measured. The procedure was as follows.

First, an acidified solution containing .00056 grm. of iron was diluted to about 90 c.c.

Secondly, the iron extracted from a known weight of flowers was dissolved in hydrochloric acid and, like the first solution, diluted to about 90 c.c.

Thirdly, to each solution were now added some 4 or 5 drops of a normal solution of potassium ferrocyanide, and the whole well mixed.

Finally, each solution was diluted to 100 c.c. and the relative colour intensities of the two determined in the following way.

To begin with, two similar glass tubes each closed at one end, were prepared. Then the iron solution (now in the form of Prussian blue) obtained from the flowers, was poured into one tube to (say) a depth of 10 cms. Holding the tube over a white and well lighted surface and looking down through the column of liquid, a certain undetermined depth of colour was seen. The second tube was now held close to and parallel with the first, and the standard solution of iron introduced little by little until finally the depth of colour was judged to be one and the same for both tubes. The colours having thus been matched, the amount of iron present in each tube is one and the same : and as the weight of the iron contained in the standard solution is known, that present in the other can now be calculated. The following example will make all this clear.

Weight of flowers used = 20 grms.
Length of column of solution under examination = 8.0 cms.
Length of column of standard iron solution = 6.5 cms.

Remembering that the weight of the iron per unit volume is inversely proportional to the length of the column of the solution, we have from these data

$$\text{Percentage iron} = \frac{6.5 \text{ x } .00056 \text{ x } 100}{8 \text{ x } 20} = .002275.$$

Having now in some measure dealt with certain essentials, we here give, as being representative, the results yielded by the analysis of some pink flowers.

Water	=	87.400	per cent.	
Ash	=	.765	,,	
Silica	=	.150	,,	
Iron as Silicate	=	.00004	,,	= 4 parts per 10 mill.
Other iron	=	.00054	,,	= 54 ,, ,, ,,
		88.31558	,,	
Undetermined Constituents	=	11.7		

In passing now to our prime objective, we may, for the sake of clearness, state that the systematic examination of flowers of the selected four plants consisted of periodic determinations of the above named constituents. Our immediate purpose will, however, be achieved if we confine our attention to the observed variations in the iron content of the flowers; and this we shall accordingly do.

Attention may first be drawn to some results obtained during August. The two series of experiments were separated by an interval of one week.

Plant.	Colour of flower.	Iron content per 1 million 1st Series.	Iron content per 1 million 2nd Series.	Conditions of growth.
No. 1	Pink	18	14	Natural
No. 2	Blue	23	16	Under influence of voltaic couple
No. 3	Mauve (pale)	22	41	

It will be observed that the pink flowers which were formed under natural conditions, yielded *less* iron than did those which had been subjected to the influences of the voltaic couples. It will also be seen that during the additional period of one week the iron content of the pink and also that of the blue flowers decreased, the former by 4 and the latter by 7 parts per 1 million : whilst on the other hand the iron content of the mauve flowers increased by 19 parts per 1 million.

On the expiration of the further successive periods of two, three and four weeks, other mauve coloured flowers were collected from the plant No. 3 and analysed with the following results :—

	Additional interval.	Iron content per 1 million.
Colour, deep mauve	2 weeks	0.6
	3 ,,	.7
	4 ,,	.3

Similar periodic analyses of flowers having colours other than mauve yielded results corresponding to those tabulated above. We therefore infer that the observed variations in the iron content during the development of, and subsequent attainment of maturity by, the flowers, are both general and normal.

Summarizing our results and conclusions we have

(1) For the production of colour, the presence of iron is indispensable.

(2) Rich colours are produced only when the iron present in the soil about the roots exceeds some as yet undetermined minimum percentage; and

(3) When the colour pigment has been built up, the plant, having no further use for the iron, continuously eliminates or ejects it, and at the same time refuses the element all further entry.

In support of these conclusions, the following confirmatory evidence may be adduced.

Towards the end of September a small hydrangea growing in a sheltered spot was seen to possess flowers in very different stages of development. One cluster, the flowers of which were on the point of opening, was of a pale olive green. A second cluster, not fully developed, was pink; whilst a third, consisting of mature flowers, was of a dull green colour. These were analysed with the following results :—

Colour of flowers.	Weight of iron per 1 Mill. parts.	Water.
Pale olive green	0.14	81.5 per cent.
Pink	1.40	87.4 ,,
Dull green	.18	85.1 ,,

As will be seen, these data are in complete agreement with the conclusions of the preceding summary. We therefore inferred that by cultivating hydrangeas in a soil destitute of iron, we should succeed in obtaining flowers which would be perfectly white. But whilst plans were being formulated for such an experiment, a plant having white flowers was discovered. It possessed some 9 or 10 fine clusters; and these collectively shewed the flowers in various stages of development. The plant was secured and some of the mature flowers analysed. Instead of an expected negligible quantity of iron, the amount found was quite normal, and equal to

21 parts per 1 million.

From this it would appear that these white flowers had, like all others, become fully equipped for synthesizing one or more of the anthocyanins; but that owing to an entire lack in the soil of the necessary material, the formation of a colour-producing substance was an impossibility. In confirmation of the correctness of this view it may be said that the results of periodic analyses proved (*a*) that the iron content of the flowers remained within the limits of 19 and 22 parts per million; and (*b*) that the iron present in the form of silicate, in every instance relatively large, continuously increased; and so, on successively comparing this iron with that present in other forms, the initial ratio of 1 : 1.7 gradually gave place to a final ratio of 1 : 1. Normally, as we have already indicated, the iron content and the colour of the flowers first simultaneously increase; then, the colour having been fully developed, the iron content continuously lessens to a minute and insignificant quantity.

From the evidence now available, the conclusion was drawn that white flowers are producible in two ways. According to one plan, in which iron is rigorously excluded, the materials necessary for the formation of a pigment may be present in abundance; yet no such pigment can be formed because of the lack of iron which when present functions in some as yet unknown manner. According to the second plan, the supply of iron may be ample; but there may be a dearth of material for it and the flower (or plant) to operate upon. In either case it would appear that the result must be one and the same, namely, the production of a colourless flower.

In conclusion, attention may be directed to yet another way for securing whiteness; namely, that of colour compensation, a method which may perhaps be best illustrated by a reference to that adopted for the manufacture of colourless glass. The materials used for glass-making contain an unavoidable small quantity of iron. This iron imparts a colour termed "bottle-green." The green colour can be and often is balanced or compensated by including in the mixture from which the glass is made the appropriate quantity of manganese dioxide. When added to a colourless glass, manganese dioxide produces a well marked pink. But pink and green are complementary colours; and these, when duly proportioned, create the sensation of whiteness Is it not possible and even probable that in some instances the observed whiteness of a flower is due to a similar and corresponding optical balancing of two complementary colours? Further experiments can alone supply the answer.

"Magnetic Storms, Plant Life, and Prosperity."

By C. CONYERS MORRELL, M.D. (Brux.), D.P.H., F.S.S., F.R.A.S.

The first thing we enquire about in the morning, and the last thing which it occurs to us to speculate upon at night, especially in so fickle and changeable a climate as our own, is the Weather. It controls all our proceedings, and modifies all our results; in short, it is of equal concern to the physician, to the sailor, to the poet, to the agriculturalist, and to the natural scientist. There is, in fact, no phase of existence which is not in some degree subject to modification by weather, and weather, like life, is a gift of the Sun.

Very broadly we can divide the meteorological conditions which prevail over our globe into two categories; the first, Climate, or the average weather conditions which reign in different latitudes; the second, Weather, or local, and even widely spread, atmospheric disturbances, such as cyclones, anticyclones, rain storms, and thunderstorms. Both Climate and Weather are of course subservient to seasonal variations.

The main determining causes of the seasons—Spring, Summer, Autumn, and Winter—and of geographical climate in the broader sense of the term in so far as it varies in different latitudes and at different times of the year, is partly the intensity and distribution in latitude of the heat radiated by the Sun. This varies in accordance with the distance and axial angle which the Earth presents to the Sun in its annual course along its orbital path, and also in relation to the geophysical circumstances of the Earth's surface.

Superimposed, however, upon these regularly recurring seasonal and geographical variations of Climate, there occur continuously over all parts of the globe sometimes limited, though frequently widespread, irregularities which we sum up in the general term Weather; and which when viewed broadly over long intervals of time show considerable evidence of occurring in spells or cycles of varying duration.

Many interesting facts have been discovered in connection with these weather cycles. Briefly, it may be said that main cycles have been discovered, by Bruckner and others, having a period of roughly 35 years, composed of a wet period of approximately 17 years, followed by a dry period of 17 years. Underlying these there is evidence of shorter cycles of varying duration.

While there can be little question that many local disturbances of weather—sudden storms, rains, droughts and so on—depend largely upon accidental variations or combination of terrestrial atmospheric and geophysical conditions, such, for instance, as are brought about by the turbulence and consequent convection of the air, volcanic eruptions, and similar causes, considerable evidence has become accumulated to give grounds for the hypothesis that the main underlying cause of weather cycles is to be found in the electro-magnetic disturbances which occur in the outermost layers of the Earth's atmosphere, and that these disturbances are induced by ionised particles projected through space from the storm areas or Sunspots which take place periodically in the depths of the Sun's atmosphere.

Sunspots in actuality are inconceivably terrific cyclonic whorls, or great funnel-shaped vortices, in the gaseous atmosphere of the Sun. In these, magnetic fields are produced by the rapid rotation of electrically charged particles within the vortices. Outbreaks of sunspots, which wax and wane, occur periodically at intervals of approximately eleven years, and at each period the magnetic field becomes reversed. These outbursts are frequently accompanied by the projection from the Sun of immense flames many millions of miles in length which are known as Prominences.

During the past fifty years or so very careful records have been kept of the variations of the Earth's magnetic current, variations which are able to be recorded by observing the oscillations of the magnetic needle. From time to time it has been found that sudden and sometimes very considerable oscillations of the magnetic needle take place. These disturbances are accompanied by other manifestations, in particular, by marked disturbances of telegraphic systems and wireless reception, and also by displays of the aurorae, borealis and australis, the northern and southern lights, electrical manifestations which occur in the outermost regions of the atmosphere some 50 to 300 miles above the Earth's surface.

Taken as a whole, these disturbances of the Earth's current are spoken of as Magnetic Storms. From careful and continuous records which have been kept a very interesting fact emerges, and this is that Magnetic Storms increase in frequency and violence approximately every eleven years, that they wax and wane, and that they follow exceedingly closely the rise and fall of the solar storms or sunspot outbursts. Not only do they follow the general rise and fall of the solar storms year by year, but they are found actually to coincide daily and even hourly. It has further been found that magnetic storms of exceptional intensity occur when great prominences are projected from the Sun's atmosphere, and when certain types of spots are carried across the central meridian of the Sun.

There is now, in fact, conclusive proof that the magnetic storms which occur on Earth are intimately associated with outbreaks of sunspots. Put very simply, and avoiding technical phraseology, the fact is that as the magnitude and number of storms increase in the Sun's atmosphere electrical particles are shot out from the Sun, some of which impinge upon the Earth's outer atmosphere and there set up terrestrial magnetic storms.

Sunspots, magnetic Earth currents, atmospheric electricity, and aurorae, form a series of closely related phenomena, and considerable evidence has now become accumulated to show that variations in meteorological conditions—temperature, pressure, rainfall, and so on—are very largely, possibly entirely, due to the action of magnetic storms upon the outermost layers of the Earth's atmosphere. The origin of our weather cycles is in fact to be found in the heart throbs of the Sun, and so, as has already been said, weather, like life, is a gift of the Sun.

A considerable amount of statistical evidence is now available to show that there exists a close relationship between magnetic storms and rainfall. From an extensive study of rainfall and temperature records, Professor Nodon, of the Astrophysical Observatory at Paris, has shown that when the Earth's electric charge increases there occurs in certain regions of the Earth increase in rainfall, accompanied by atmospheric electro-magnetic disturbances, diminution of barometric pressure, and cyclones; and he has further shown that at times a remarkable correspondence occurs between temperature, rainfall, and sunspot activity. Further evidence of the close association between rainfall and solar activity is to be found in the close correspondence between the rise and fall of lake levels in different parts of the world and the curve of magnetic storms. Using Greenwich rainfall records I have found that over a considerable period a close relationship between rainfall and magnetic storms occurs having the high correlation coefficient of 0.84 ± .003.

During studies carried out by Professor Douglas of the Carnegie Institute upon the curve of the annual growth of a number of pine trees at Eberswalde near Berlin, he made the remarkable discovery that the curve of growth corresponded closely with the sunspot curve, and he arrived at the conclusion that the rate of tree growth was cyclical and dependent upon climatic conditions attributable to solar periodic activity. Professor Huntington of Yale University, in order to determine as far as possible the climatic conditions relative to these curves, worked out two sets of correlation coefficients for each month of the year, one set having reference to the association between temperature and growth, and the other to that between rainfall and growth. By this means he arrived at the conclusion that the curve of tree growth represents the main fluctuation in the cyclonic storms of Central Europe in summer, and that the storminess varies in close harmony with variations in sunspots. Similar relations have recently been established by O'Connor and de Lury for spruces and butter-nut trees.

Short consideration must now be given to the various factors which affect plant growth and plant abundance.

If a seed is placed in quartz sand, kept in light, and watered from time to time with a solution of mineral salts, and further is kept at a suitable temperature, the seed germinates, throws up a stalk which bears leaves, and then flowers, and fruit. The plant, in fact, has in some strange manner converted inorganic mineral salts into organised organic compounds. Two things, and two things alone, make this amazing transmutation possible; the radiation proceeding from the Sun, and the wonderful green substance Chlorophyll. The plant by virtue of its chlorophyll absorbs solar energy, takes up carbon-dioxide from the air, and then builds up, from water and inorganic salts, organic matter charged with latent energy. This constructive or synthetic activity of the plant through the agency of solar radiation is termed photosynthesis, and it is the prime source of all organic life on Earth.

Animals, since they have no chlorophyll, do not possess this power, and can only obtain organic compounds for their growth and nourishment by consuming those which have been manufactured by green plants. In consequence, without plant life there could be no animal life, and hence no human life.

The green substance chlorophyll is derived from a colourless chromagen, Leucophyll, which occurs in the chromatophores of all green plants, and its formation is brought about in the leaves and stems of plants by the influence of the red, orange, and yellow rays of the solar spectrum. Next, under the influence of the blue-violet light of the solar spectrum, active decomposition of chlorophyll formed takes place, which enables the plant to build up from inorganic salts and gases organic bodies—sugars, starches and hydrocarbons—which form the flesh or substance of the plant. It is entirely upon solar radiations absorbed by the leaves of plants that photosynthesis or the growth of the plant depends. Consequently, upon the varying amount of light radiations which reach the Earth from the Sun depend primarily the abundance and the rapidity of all plant growth.

The plant, however, cannot thrive and flourish on sunlight alone; there are many other factors which contribute materially to the abundance of plant growth, and without which sunlight alone could not be effective. Among these are the presence of inorganic salts in the soil in which the plant grows; the presence of water; and the presence of nitrogen, carbon-dioxide, and other gases, in the air.

Of these, the inorganic salts of the soil are derived mainly from the elemental substances, the rocks and minerals of which the Earth is composed, and these vary considerably in composition and distribution geographically, even the soil of adjacent fields displaying marked differences in mineral content. All the water which moistens the soil is of course derived from rain precipitation. Here again we find that it is upon the Sun, in this case the Sun's heat rays, that plant life depends, since the whole of the rain which falls upon the land and fills our rivers and springs results from evaporation of the waters of the oceans by the Sun's heat, the moisture-laden air, or clouds, being conveyed across the land by winds.

With regard to the gases of the air, their quantity and nature is determined very largely by rainfall and sunshine. In addition, electrical disturbances of the atmosphere play a very important part in two ways; firstly, in connection with the supply of nitrates in the soil required for the nourishment of the plant, and secondly, in connection with the formation of nitric gases which have the important effect of stimulating the plant in its assimilation of carbon-dioxide from the air, that is, of increasing what is known as the tonicity of the plant.

Plant tonicity has been found to be markedly affected by the oxides of nitrogen which are formed in the atmosphere during electrical disturbances such as thunderstorms. Remarkable experiments carried out by the celebrated Indian botanist, Sir Jagadis Bose, have demonstrated that so amazingly sensitive is plant life in this respect, that so minute a trace as one part of nitric acid in two billion parts of water induces an increase in the rate of carbon-dioxide assimilation of nearly twenty per cent.; and he discovered the further amazing fact that at this dilution a threshold is reached beyond which stronger solution produces a depression below normal.

Another very important fact in the physiology of plant-growth is that the nitric oxides formed in the atmosphere during thunderstorms become dissolved in the rain or in the water of the soil, and are thus brought into contact with the plant roots in the form of soluble calcium nitrate, the nitric acid being utilised by the lime in the soil to form this salt. Atmospheric nitrogen plays a further important rôle in plant growth. Apart from a few species, such as the legumes, the higher plants are unable to assimilate free nitrogen. Free atmospheric nitrogen can, however, be absorbed and fixed by certain soil bacteria, the azotobacters as they are called. The nitrogen compounds so formed are then easily assimilated by the roots of the plants, and are then converted into very complex nitrogenous organic compounds in the substance of the plant.

From these facts it becomes evident how immensely important weather, and the many meteorological circumstances which comprise weather variations, are to the growth and abundance of plant life. Needless to say in addition to these meteorological variables many other determining causes are also involved in plant growth and abundance; for instance, the preparation of the soil by tilling and manuring, lime content, the time of sowing, quality of seed, and so on. All these must be taken into full consideration in the mathematical analysis of plant growth.

If now we think of plant growth and plant abundance in terms of cereal harvests, of vegetable yields, and of fruit crops—that is in terms of the food of man—it becomes abundantly clear that, all but entirely, upon the variation of radiant energy which reaches the Earth from the Sun, and particularly through the intermediary of magnetic storms and their effect upon weather, depends the abundance or scarcity of food of the peoples of the Earth.

A study of the curves of biannual rainfall in relation to the annual yield of wheat per acre in England over many years shows that a very definite correlation exists between the two; the more rain the less wheat. A dry September-October ranks first among wheat's requirements, and taking the period of fifteen years 1897 to 1911 for the cereal year there is in fact between September-October dryness and wheat yield the high coefficient of 0.69.

Many other crops show a similar marked relationship to meteorological circumstances; for instance, the yield of swedes per acre in relation to humidity and magnetic storms, curves of the time of flowering of lilacs and chestnuts, as has been demonstrated by the Abbé Moreux, in relation to the curve of magnetic storms and the sunspot cycle; while the influence of weather variations upon grape harvests and fruit crops expresses itself indirectly by precisely corresponding fluctuations in the prices of wine and oranges.

In recent years, especially since the War, the study of socio-economics has become greatly intensified, and particular attention has become focussed upon the rise and fall of markets in relation to national and world prosperity. Periods of depression have been shown to alternate with periods of prosperity, and these periods are spoken of as "trade cycles." Statistically they are found to consist of major cycles of seven, ten and eleven years, composed of two or three minor cycles having a duration of approximately three and a third years. Numerous theories have been advanced to account for these cycles, and among them a theory, which finds their main underlying cause in the cyclical variations which occur in the abundance of the world's harvests, has met with wide acceptance. Years of good harvests with low prices increase the purchasing power of agriculturalists for manufactured goods, and so bring about industrial activity and a coincident wave of prosperity.

As already shown, the abundance or scarcity of harvests is dependent almost entirely upon meteorological circumstances, that is upon climatic changes and weather variations, which changes are primarily attributable to the effects of magnetic storms in relation to the Earth's atmosphere. These storms we now know are intimately associated with the storms which take place in the Sun's atmosphere. "Hence," as Professor Jevons has recently said, "it is by no means a flight of imagination to attribute alternations of prosperity and depression in world trade partly to the variability of the Sun."

Statistically, at the present time, relationship between harvests and trade fluctuations presents considerable difficulties in its demonstration; firstly, on account of the very intricate and complex machinery governing modern economic exchanges, and secondly, on account of the difficulty of correlating highly diverse and frequently ill-defined variables. This is largely attributable to the immense increase in populational density which has occurred during the past century in all parts of the world, and to the highly complex methods of production and distribution which necessarily have accompanied these populational changes.

In but few parts of the world at the present time is the relationship between population and subsistence a simple matter. In earlier times, however, this relationship was far more direct, and if we go back far enough, say two or three hundred years, we find it so direct that but little difficulty arises in demonstrating in terms of simple values the very close correspondence which certainly in those times occurred between the abundance of harvests and human prosperity.

Prosperity is a somewhat difficult term to define, since it comprises so great a multitude of inter-related composites, and it is difficult to select any one of these which at all times and in all places adequately and completely represents the rise and fall of either individual, or national, prosperity. It is, however, possible to measure prosperity indirectly by its effect upon populational movements, and it has been found that the fluctuations which occur in the marriage-rate afford an extraordinarily reliable means to this end.

Although populational movement is most readily analysed in terms of vital rates, it is abundantly evident that the rates themselves are but the expression in mathematical form of the effects of environmental conditions upon groups of individual members of the community. Vital rates are, in short, the resultant of environmental forces, which forces themselves are influenced and controlled in some part, both directly and indirectly, by the energies of the populations in which simultaneously they excite disturbances. For these reasons the marriage-rate affords a trustworthy test of national well-being.

In early times the population of England was almost entirely rural in character, and the bonds which united the greater part of the population to the land were strong, and movement of population from one district to another was limited. In consequence, a year of good harvest, with its corollary a low price for wheat, meant for the population work and wages, with the result that the labourer having money in his pocket was urged to consummate union with his intended. His natural instinct, then as now, was to act on the impulse of the hour, little considerate of the future. For this reason the marriage-rate in early times exhibits far sharper and more sudden fluctuations than in modern times, since periods of agricultural prosperity were controlled very markedly by meteorological circumstances such as dry seasons and wet seasons, winds and sunshine.

Prior to the third decade of the nineteenth century no records were kept for the country as a whole of births, deaths, and marriages. It is, however, possible, by analysis of the entries in the Parish Registers, which were first established in England at the instigation of Thomas Cromwell in the reign of Henry VIII, to determine marriage and other vital rates within a reasonable degree of accuracy, while records preserved of the mean annual prices of corn at Eton and elsewhere enable the abundance or scarcity of harvests to be known.

As the result of the analysis of many thousands of entries in early English Parish Registers I have been able to prepare a series of graphs which demonstrate in a most remarkable manner the very close correlation which existed in early times between harvests and the marriage-rate. Taking the period, for example, 1615 to 1637 we find almost perfect correlation between the two, the marriage-rate following perfectly harvest abundance, not only in direction but also in degree. Taking the period of sixty-five years, 1755 to 1820, which covers the phase of economic history known as the Industrial Revolution, we find the same general tendency to occur.

Passing to more modern times, taking the period 1870 to 1895, we can still trace, in spite of the very great changes in the economic and populational structure of the country which have occurred during the nineteenth century, a definite tendency for the marriage-rate to follow the price of corn, and so still to be controlled by meteorological circumstances. In addition, by correlating the fluctuations of total imports and exports, a very direct index of national trade, we find a very close association between national prosperity as indicated by trade fluctuation and the marriage-rate, and we observe how trade prosperity is itself associated with the vagaries of weather.

Since the marriage-rate serves as the barometer of national prosperity, we must expect to find that the marriage-rate bears also a close correspondence to other economic factors. That such is the case can be clearly demonstrated; for example, it can be shown that the total consumption of alcohol, the rise and fall of the amount of money cleared annually at the Bank of England, and fluctuations in unemployment, are closely associated with fluctuations in the marriage-rate and with rise and fall of late summer temperature, or in other words with the weather variant which determines the wheat-harvest yield.

Taking these and many other facts into consideration there appears to remain little doubt but that the most dominant factor in the determination of national and world prosperity is to be found in weather cycles, the march of which is primarily determined by sunspot periodicity through the intermediary of terrestrial magnetic storms.

"Creech Barrow."

By Henry Bury, M.A., F.G.S.

Creech Barrow, so well known to all visitors to the Isle of Purbeck as a conspicuous landmark, presents several points of special interest to geologists, the most obvious being that in it the Tertiary beds attain a far higher altitude than elsewhere in the surrounding country : for whereas all over the Great Heath of Dorset, and along the foot of the Chalk Downs to the north and south of it, these strata seldom rise more than 300ft. above sea level, the top of the Barrow stands at 637ft.

It is a safe inference in such a case that the hill must be capped by some comparatively hard and resistant stratum; but while such a layer is scarcely affected by the direct attack of rain, yet the washing away of the softer beds on the slopes of the hill tends to undermine it, and causes it to crumble away at the edges; so that the protecting cap gradually diminishes in area, and the hill tends to become more and more conical, though, until the cap is altogether removed, there is no lowering of the hill, which on the contrary may be increased in relative height by the washing away of the softer beds at its foot.

Seeing how well known these general principles are, it is surprising that the officers of the Geological Survey, who were responsible for the Memoir of the Isle of Purbeck published in 1898, should have been content to map the whole of Creech Barrow as Eocene without even taking the trouble to ascertain the nature of the topmost bed. Mr. W. H. Hudleston who, under the auspices of the Dorset Field Club, explored the Barrow in 1901, was fully aware that a resistant capping must exist, but expected it to consist of plateau gravel (Pleistocene), which forms the summit of so many of our local hills; though he admits that he ought to have taken warning from the covering of smooth turf, since plateau gravel is associated with heather rather than grass.

But in spite of this botanical clue, it is safe to say that no one expected what was actually found—namely, a layer of limestone; for such limestone is not present in any of the Eocene beds of the Hampshire Basin. It does however occur in the Oligocene beds of the Isle of Wight, especially in the Bembridge Beds, and it was therefore suggested that this Creech Barrow limestone might be of Oligocene age, in spite of the fact that nothing of that date had so far been recognised further west than Hordle, more than 20 miles to the east. Hudleston was opposed to that view, but this was largely because he held that the pipe-clay beds, which were then being worked on the north side of the hill, had once extended over the top of it; in which case all the remaining strata must be Eocene. We now know that Hudleston was mistaken, and that actually the pipe-clay extends under the hill, and, bending upwards, comes to the surface at the foot of its southern slope: but in any case the age of the limestone could only be finally settled by means of fossils, and in his search for these Hudleston was unfortunately not very successful. He found only two poorly preserved species, which he tentatively identified as Paludina lenta and Melanopsis brevis; but even if this identification is correct, it gives no certain information as to the age of the beds.

In 1910, however, H. Keeping succeeded in finding no less than 20 species of shells (land and freshwater) and was able to identify the following: Achatina costellata, Bulimus ellipticus, Clausilia striatula, Cyclotus cinctus, and Helix occlusa, and on the strength of these the limestone is now officially recognised as the equivalent of the Bembridge limestone. Although there is no reason to doubt this very plausible conclusion, yet it may not be amiss to mention that the fossils found in any particular strata depend not only on the age but also to some extent on the character of those strata. The limestones of Bembridge and Creech are tufaceous, and from the presence of several land shells we may assume that they were not formed in a lake, but in a swamp, the water in which was highly charged with lime, and was liable to rather rapid evaporation. Such conditions are usually local, and it is quite possible that if they had occurred somewhat earlier (or later) at Creech than in the Isle of Wight, they would still show the same fauna in the two districts. But even if we accept strict contemporaneity, there is no ground for Keeping's assumption that the two limestones were continuous with one another; for in that case we should almost certainly have found other evidence of the Oligocene period between Creech Barrow and the sea (Studland Bay).

How very local the formation of tufa may be is shown by the presence of an isolated bed of Early Neolithic (Mesolithic) age at Blashenwell, near Corfe; and although conditions might be expected to be favourable for its formation at other points along the foot of the limestone (Purbeck and Portland) hills, no other bed is found.

If we accept the Oligocene age of the Creech Barrow limestone as reasonably certain, our next task is to ascertain how many of the strata below the summit can be assigned to the same period. But here unfortunately our data are still very imperfect. Hudleston failed to establish any close correspondence between the beds on the south and the north sides of the hill, and there is some reason to fear that he may have included as Eocene what was more probably " hill-wash " of Pleistocene age. Keeping, on the other hand, though he draws a section in which he names the strata right down to the chalk, gives no details of his work, and certainly he found no fossils with which to identify the successive beds except in the limestone. It seems however to be agreed that immediately below the latter there is a layer (perhaps 20ft. thick) of marl with calcareous concretions, and this Keeping plausibly identifies with the Osborne Beds of the Isle of Wight (Oligocene). Below that Hudleston found a layer (1 to 4ft. thick) of flints, mostly of large size, and although flints are not unknown in the Oligocene, they are perhaps more likely to be Eocene (Bracklesham?). Keeping however who, on very obscure grounds, claims to have found a thick series of Headon Beds (Lower Oligocene) below the Osborne, boldly dismisses these flints as " plateau gravel." But although Hudleston may, as already hinted, have sometimes mixed up the Eocene and Pleistocene, he can hardly be wrong in this case, since he not only traced this layer of flints under the calcareous marl, but used them to ascertain the angle of the dip (10° to 12° E. of North). As too the plateau gravel produces nothing new, but only redeposits what it finds to hand, we should, if Keeping's view were accepted, still be left wondering where these large flints had come from.

If we now provisionally regard these flints as marking the top of the Eocene, we are struck by the wide difference in thickness between the Tertiary (Eocene and Oligocene) strata of Purbeck and the Isle of Wight respectively. In the former our data are very unsatisfactory, but it does not seem that the Eocene beds can be more at Creech Barrow than 400-500ft. thick (from the flints to the chalk), whereas in the Isle of Wight they would (measured from the top of the Barton) be about three times as much; while the Oligocene Beds which in the Isle of Wight measure 500ft. or more, are reduced at Creech Barrow to about 30ft. But these discrepancies are not really so surprising as they appear at first sight. We have proof that from the very beginning of the Eocene, the secondary strata of the south of England were tilted towards the east or south-east, and the consequence of this is that the successive Eocene beds are all more or less wedge-shaped, being thickest in the east, and thinning out westwards until they reached dry land, which was never very far away from the region we are considering. For example, the London Clay, which in the Isle of Wight is more than 300ft. thick, is estimated at Creech to be only 70-80ft.; and if we allow similar reductions in the succeeding beds, the difference between the two regions is easily accounted for.

The case of the Oligocene beds is even less remarkable, for they are mainly of freshwater origin, and were probably local developments, not extending to the Isle of Purbeck, which may have been dry land, undergoing subaerial denudation, even before the end of the Eocene. In that case we might expect that the washing away of the lighter particles of sand and clay would leave a residuary layer of flints which originally belonged to several horizons.

But before we finally accept the layer of flints as marking the top of the Eocene beds, we must consider certain statements by Hudleston which place obstacles in the way of this explanation: for he describes them as " large unrolled flints " in one place, and in another as " for the most part unabraded flints." Now it is possible for such large flints (up to 30lbs. weight) to be transported by the sea, by rivers, or (under suitable climatic conditions) by ice; but all these agencies very soon cause abrasion, and so, if any large proportion of the flints are really unrolled, it is necessary to find a source for them extremely close at hand; and that presents difficulties. We know that even at the beginning of the Eocene, chalk (from which all flints are ultimately derived) was exposed further west, but the great upheaval of the Purbeck anticline did not occur till the Miocene period, and although some movement along this axis may have begun earlier, yet it is almost certain that the Eocene extended right across this region, and it is extremely improbable that even in Oligocene times any chalk was exposed sufficiently near for large boulders to reach Creech Barrow without abrasion. There is however one possible way in which such flints might arrive, though only at a decidedly later date than has so far been contemplated. When the great upheaval of the Purbeck anticline occurred (in late Oligocene or early Miocene times) the chalk strata were tilted into a vertical position, or even beyond it, and the great fault was produced which can be seen in the cliffs at Ballard Down, and is supposed at Creech Barrow to run nearly along the present junction of the Secondary and Tertiary strata. We do not know how rapid these movements were, or what the physical geography was at the time of their occurrence; but it is at least not improbable that a chalk cliff was formed from which a talus would fall on to the adjoining Tertiary strata, and there may also have been extensive landslips connected with the earthquakes which would almost certainly accompany the formation of the fault. In such a talus or landslip there would be many large flints from the upper chalk, and as the chalk rubble round them was washed or dissolved away, many of them would accumulate in a layer overlying the Eocene beds. Others might remain in the fallen material, and so enable us to understand Hudleston's further statement that flints are

" disseminated occasionally through the sands and clays "—a position which would be extremely hard to understand if the flints were water-borne. At a later stage water oozing from the chalk, and heavily charged with lime, might give rise to the calcareous marl and limestone which we now find at the top of the Barrow.

It will at once be objected that this hypothesis requires a Miocene age for the limestone, while its fossils point to the Oligocene, but this argument loses some of its weight when it is remembered that we know nothing at all about the land and freshwater fauna of England in Miocene times, and it is therefore possible that many of the Oligocene species may have survived to later dates.

But that is guesswork; and although this hypothesis may be difficult to disprove, it rests entirely on Hudleston's statements concerning the condition and distribution of the flints; and since he clearly did not appreciate the nature of the problem involved, it is perhaps unfair to take him too literally. Some day the whole series of Creech Barrow strata will have to be re-examined, when attempts must be made to reconcile Hudleston's with Keeping's observations, and to resolve the puzzling differences found by the former on the northern and southern slopes of the hill; and until that has been done perhaps our wisest course is to assume that the flints are really waterworn to a degree consistent with their accumulation in Eocene times.

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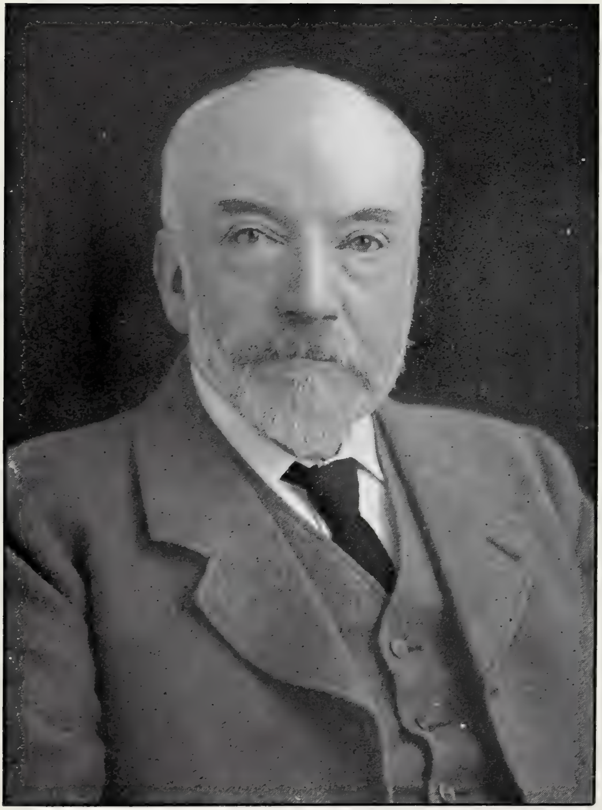

DR. DUKINFIELD H. SCOTT.

Obituary Notice.

Dukinfield H. Scott, M.A., LL.D., F.R.S., F.L.S., F.G.S.

Dr. Scott held a unique position in the history of the Society, his two tenures of office as President being separated by an interval of 20 years. A comparison of his two Addresses on " The Seed-plants of the Coal " and " Fossil Plants and Evolution," which may be found in Vols. 3 and 23 of our Proceedings, will make it clear that his highly original explorations in the field of Fossil Botany, on which his early reputation was mainly based, were continued and remained of absorbing interest to the end of his life. This interest was, as he himself freely acknowledged, initiated and stimulated by the late Prof. W. C. Williamson, with whom he subsequently collaborated with conspicuous success until the death of his partner in research. Then came interesting discoveries of many Palaeozoic plants. In 1904, following a most important discovery by Prof. F. W. Oliver that certain seeds known as *Lagenestoma* belonged in all probability to the genus *Lyginodendron*, a plant in habit and foliage closely resembling a tree-form, a paper was published by Oliver and Scott in which the name *Pteridospermeae* was proposed for a group of certain fern-like seed-bearing plants which played a prominent part in later Palaeozoic and, as we now know, in early Mesozoic floras. For several years Scott regarded the Pteridosperms as closely related to tree ferns and derived from a fern ancestry; but at the Bournemouth meeting of the British Association in 1919 he definitely gave up the idea of a fern origin in favour of the view that Pteridosperms represent a long-extinct stock which passed through a fern-like stage. This change of view is characteristic of the man: when, as rarely happened, the weight of evidence was against his original opinion, he did not hesitate to acknowledge it.

His publications, too numerous to specify here in detail, ranged over a period of fifty years; his "Studies in Fossil Botany" (1900) has long been a classic, a scholarly work distinguished by well-balanced judgment and clarity of style. For particulars of the various offices which he filled and of the honours heaped upon him by learned societies and Universities at home and abroad, reference may be made to "Nature," of March 3, 1934. From 1929 onwards, having taken up his residence at Basingstoke, Dr. Scott gave vigorous support to our Botanical Section in the way of Lectures and participation in discussions. Both in and out of office he displayed keen interest in the Society. He was eminently helpful to his younger brethren, and his genial presence was ever welcome at our scientific and social gatherings. He will be remembered as one among our most distinguished Presidents.

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Compiled by the late Mr. R. A. de Paiva.

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Photographic and Record

1916-25 ... ... R. Y. Banks.
1925-30 ... ... W. Dieselhorst, A.M.I.C.E.
1930- ... ... S. Whitaker.

Physical

1904-26 ... ... Hubert Painter, B.SC., F.C.S.
1928-29 ... ... G. E. J. Crallan, M.A., M.B., M.R.C.S.
1929-33 ... ... Miss Marcia Penrose, B.SC.
1933- ... ... W. H. Marsh, B.SC.

Deputy Chairman

1926-28 ... ... G. E. J. Crallan, M.A., M.B., M.R.C.S.

Zoological

1904-8 ... ... G. E. J. Crallan, M.A., M.B., M.R.C.S.
1908-10 ... ... A. W. Thomas, M.D., M.R.C.S.
1913-14 ... ... W. Munn Rankin, M.SC., B.SC.
1922-31 ... ... F. G. Penrose, M.D., F.R.C.P., F.Z.S., M.B.O.U
1931- ... ... Rev. F. C. R. Jourdain, M.A., F.Z.S., M.B.O.U

Microscopical

1909 Mar.-10 ... J. R. L. Dixon, M.R.C.S., L.R.C.P.
1913-14 ... ... H. B. Wells, F.R.M.S.
1922-30 ... F. B. Taylor, B.A.
1930-31 ... ... F. W. Parrot.
1931- ... ... S. Whitaker.

Zoological and Microscopical

1910-11 ... ... H. B. Wells, F.R.M.S.
A. W. Thomas, M.D., M.R.C.S.
1911 Mar.-12 ... G. E. J. Crallan, M.A., M.B., M.R.C.S.
1911-13 ... ... H. B. Wells, F.R.M.S.
1914-16 ... ... T. B. Goodall, F.R.C.V.S., F.L.S.
1916-22 ... ... F. G. Penrose, M.D., F.R.C.P., F.Z.S., M.B.O.U.

Elected and co-opted Members of Council.

Title changed from Committee in 1910.

Many of these also had seats on the Council ex-officio either before or after their election or co-option. Their names are marked*

1905-7	Atkins, Dr. F.
1906-7—1908-	*Backhouse, H., F.R.H.S.
1914-15	*Banks, R. Y.
1905-6	Bax, P. B. Ironside.
1904	Bond, Dr. Eleanor.
1932-33	Borrett, Surg.-Capt. G. G.
1919-20	Boul, Mrs.
1930-	Broad, F.
1904-8	*Brownen, G., F.C.S.
1906-8	*Brumell, G., A.R.I.B.A.
1906-8	Buckland, Dr. Frank.
1930-	Burton, E. St. John, F.L.S., F.G.S., F.Z.S.
1921-22—1933-	*Cardew, R. K., B.A.
1909-11	Chandler, S. Whitty, B.A.
1905-6	Clements, Lt.-Col. W. G.
1904	Clift, Dr.
1921-28	Curme, Mrs.
1905-10	Curtis, W. Parkinson, F.E.S
1923-26—1927-30	*Dodd, Col. J. R., M.D., F.R.C.S.
1914-16	Druitt, J., J.P.
1916-17	Dyer, J. Herbert.
1919-25	*Ellis, H. J.
1910-30	French, J. M.
1929-	Fryer, Miss C. H.
1914-17	Furlong, R. O'B., C.B., M.A.
1919-Aug. 21	*George, A. D.
1904	Giles, Dr.
1904-6	*Goodall, T. B., F.R.C.V.S., F.L.S.
1918-20	Gosse, W., M.D., D.P.H.
1921-23	Gray, Arthur.
1910-15	Hamilton, G. G., M.B., F.R.C.S.
1916-18—1922-23	*Hatton, Rev. C. O. S., B.A., F.L.S.
1911-16	Hill, S. McCalmont, D.C.L.
1926-30	Hurry, J. B., M.A., M.D.
1916-19	Jeffery, T. J. P.
1930-31	*Jourdain, Rev. F. C. R., M.A., M.B.O.U., F.Z.S.
1906-10—1911-18	*Le Jeune, H.
1926-33	Longbottom, F. W., F.R.A.S.
1933-	Lowther, F. L.
1914-16	*Lyon, Claude.
1907-8	*Markwick, Col. E. E., C.B., C.B.E., F.R.A.S.
1932-3	*Marsh, W. H., B.SC.
1907-8	Maude, W. C., J.P.
1931-	Morrell, C. Conyers, M.D., F.R.A.S.
1910-16	*Morris, Sir Daniel, K.C.M.G., J.P., M.A., D.SC., LL.D., F.L.S.
1910-11	*Michell, T., M.I.C.E.
1916-19	*Neale, Joseph, B.A.
1905-6	*Ord, W. T., F.G.S.
1904	Parish, Miss
1932-3	Pattinson, Dr. T. W.
1915-16—31-32	*Penrose, F. G., M.D., F.R.C.P., F.Z.S., M.B.O.U.
1933-	*Penrose, Miss M., B.SC.
1917-18	*Rankin, W. Munn, M.SC., B.SC.
1904	Reid, C. J.

1931-32	Richey, H. A., B.A.
1919-32	Rooke, Miss S. G.
1918-19	Rothwell, Mrs.
1908-9	Scott, A., B.A.
1908-31	*Scott, J. H., M.E., M.I.M.C.E
1904-26	Sherring, R. Vowell, F.L.S.
1920-27	Simpson, Rev. E. J. Douglas, M.A
1916-29	Smythe, J. H. Ralph, J.P.
1923-	*Spencer, J. F.
1905-10	Stubbs, G. M.
1918-20	*Taylor, F. B., B.A.
1931-	Wadlow, H. J.
1921-23	*Wallace, W. G.
1907-10	*Wells, H. B., F.R.M.S.
1931-	Wetherell, Miss S.
1930-31	*Whitaker, S.
1906-7 — 1916-20 1923-	*Woodhouse, W. J., A.C.P., M.I.H.
1932-	Wren, G. G.

Various Committees

Chairman: Rev. C. O. S. Hatton, B.A., F.L.S.

1915 Dec.- Oct. 1919	General Policy of the Society.
1919 Nov.- Feb. 1920	Housing.
1920 Feb.- Oct. 1922	Housing and Finance
1922-32	Finance and General Purposes.

Library Committee

Chairmen

1918 Mar.- Oct. 1918	G. G. Grace, B.Sc., A.R.C.Sc., F.E.S.
1918 Nov.- Oct. 1919	Hubert Painter, B.Sc., F.C.S.
1919 Nov.-32 ...	Rev. C. O. S. Hatton, B.A., F.L.S.
1932-	G. E. J. Crallan, M.A., M.B., M.R.C.S.

Museum Committee

Chairmen

1917-1921 ...	W. G. Wallace.
1921-32	Rev. C. O. S. Hatton, B.A., F.L.S.
1932-	B. Gorton, M.R.C.V.S., M.P.S.

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1906-9	H. Sutton and K. H. Mundell.
1909-14	H. Sutton and E. Bicker.
1914-15	E. Bicker and H. Backhouse, F.R.H.S.
1915-17	E. Bicker and E. W. Barlow, F.R.A.S.
1917-28	E. Bicker and C. H. Blackett.
1928-31	E. Bicker and Son, and F. Broad.
1931-	F. Broad and J. C. Woods.

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